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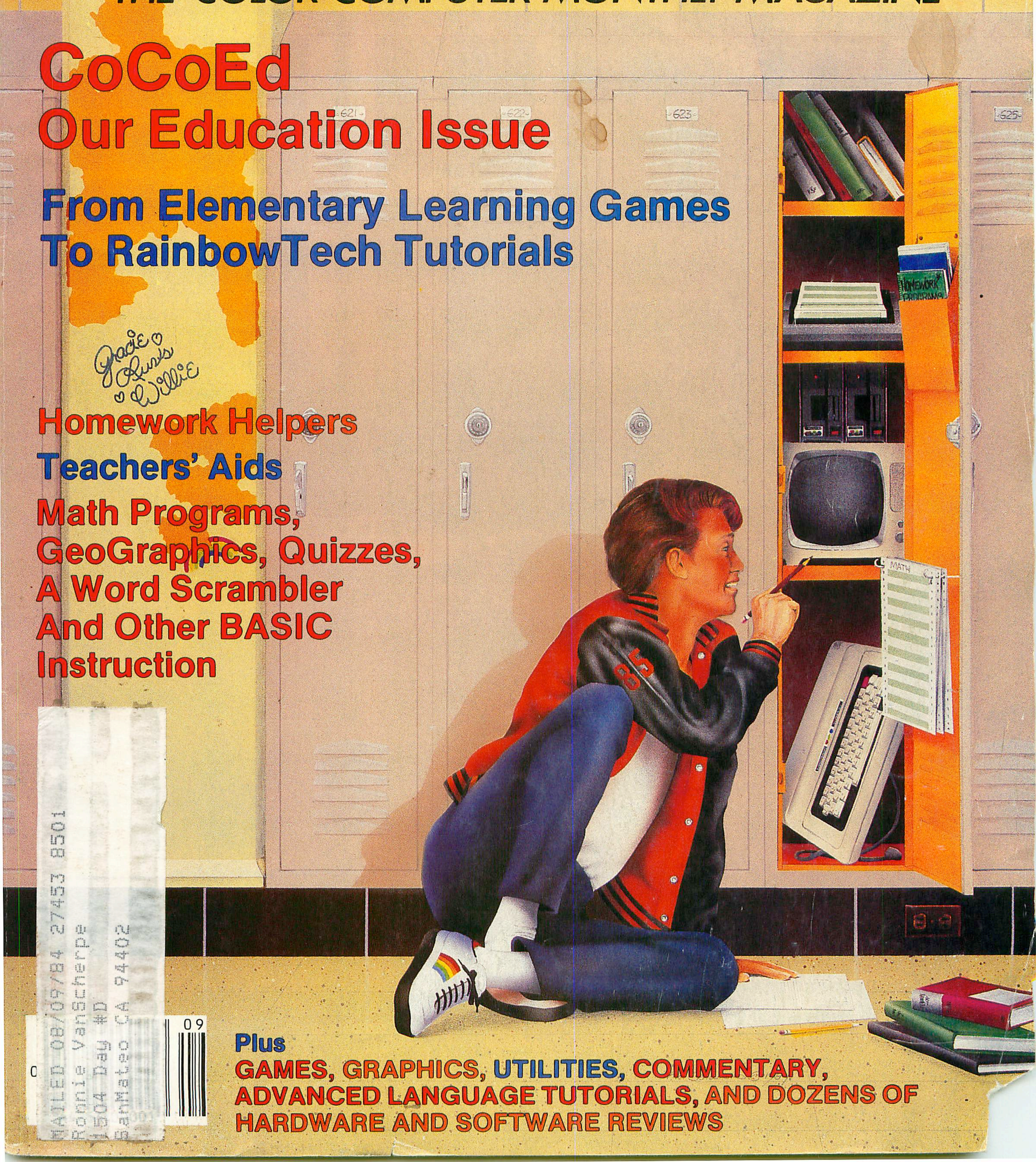
THE COLOR COMPUTER MONTHLY MAGAZINE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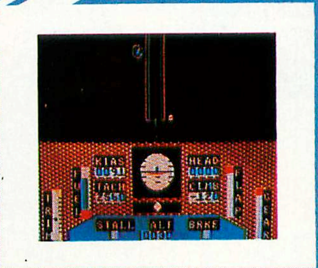

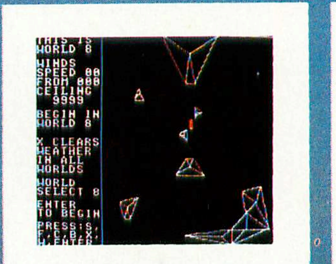

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ENTER
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F,C,B,X,
W,ENTER
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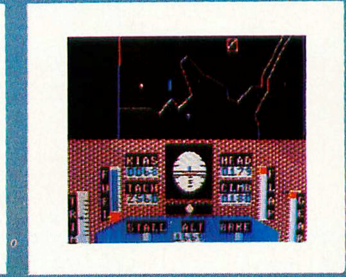

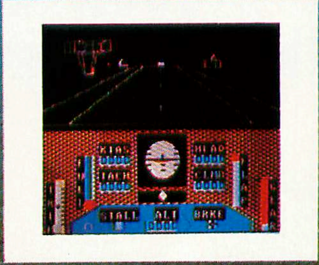

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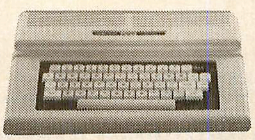

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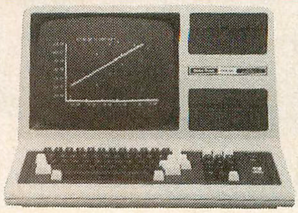

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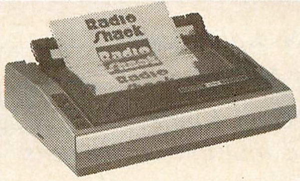

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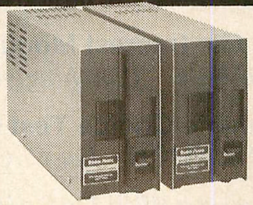

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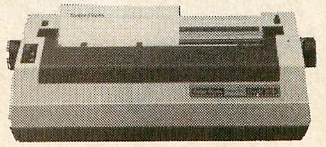

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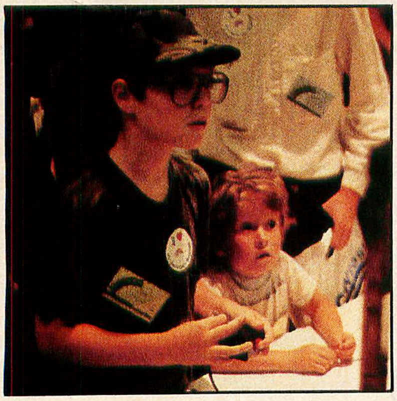
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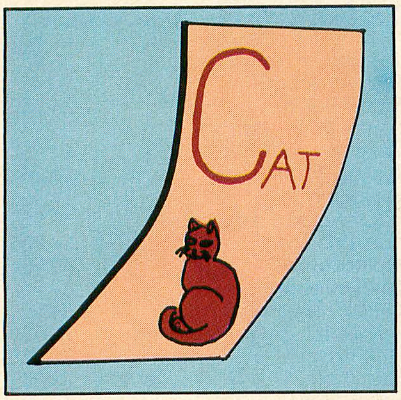
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Frank Hogg's "hogg_wash" will return next month.

NEXT MONTH: October, the time Mother Nature outfits herself in bright, gypsy colors: what better time for our annual CoCo graphics issue. We'll show you how to become a video artist, covering everything from "low down graphics" to animation. And, as election time nears, we'll have a fun quiz on Presidents. We'll also introduce a new column on data communications along with our usual varied mix of programs, tutorials, games, utilities and reviews.

Look for THE RAINBOW in October for more on the Color Computer than is available from any other source.

▭ The small cassette tape symbols beside features and regular columns indicate that the program listings with those articles are on this month's RAINBOW ON TAPE, ready to *CLOAD* and *RUN*. For full details, check our RAINBOW ON TAPE ad on Page 226.

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The RAINBOW

September 1984 Vol. IV No. 2

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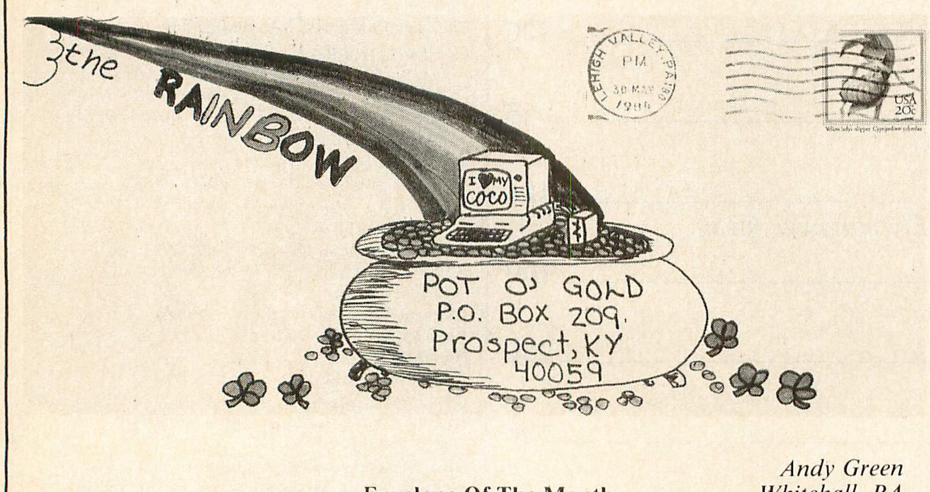
LETTERS TO THE RAINBOW

ARTS AND LETTERS



Envelope Of The Month

Andy Green
Whitehall, PA

HINTS & TIPS

Editor:

Recently, while working on a BASIC coding program, I needed an exclusive *OR* function, which CoCo doesn't have in its vocabulary.

With a little diligence and help from a friend I came up with the following:

```
10 INPUT "Numbers to be XOR'd";A,B
20 C=A AND (32767-B) OR B AND
   (32767-A)
30PRINT C
```

If the user inputs three for A and six for B, the lines will put five in C.

Example: A = 0011 3
B = 0110 6
XOR = 0101 5

The routine seems to work for all positive numbers up to 32767.

I'm sure some reader out there must be in dire need of this exclusive (pardon the pun) function.

Keep up the good work.

Burnie L. Whiddon
Orlando, FL

Editor:

I think it should be reiterated that the CoCo is in fact capable of *(C)LOADMing* with a negative offset. This was first printed on page 172 of THE RAINBOW, April 1983. Since then, at least one program has appeared that does the offsetting by another, more complicated method. The "negative offset" is not really a negative number. It is the negative offset plus *65536*, or *NEW.ADDR-OLD.ADDR+65536*. The CoCo thinks that 65536=0, so adding zero to the offset doesn't change it, but it does fool BASIC into thinking that the offset is positive. A 16-bit word containing 65535 is stored as 16 ones. Like an odometer set at 99999.9, an increment by one will throw it back to zero, so 65535+1=0.

Therefore, 65536=0, and 65537=1, etc.

Lucas Ford
Philadelphia, PA

SWEET SMELLING HINT

Editor:

Here is a little tip that may help people playing *The Arconiax Assignment* (July 1984). If you ever save a game, then load your old position, you may find something like "Scratch Box #4" when you take inventory. If this occurs, simply DROP that object and then reTAKE it. It will then appear as it correctly should when you take inventory.

If anyone has comments about the game, they may call me at the New West BBS (516) 673-9452. Leave all questions/comments on the "CoCo Goldmine" addressed to: Eric Tilenius. If you leave your address, I will reply by mail so you won't have to make two long distance calls.

Eric W. Tilenius
Huntington, NY

Editor:

I would like to pass along some information for those readers who, like myself, have a Radio Shack DMP 120 printer and have been trying to use it with the Radio Shack Graphics Pak or with disk graphics software.

Radio Shack has released a set of screen print utilities (Cat. No. 26-3121), which are designed to work with their color printers and the DMP 120.

As you will recall, RAM space is reserved starting at location &H600 for graphics pages. The Graphics Pak and disk graphics routines place the completed graphs there for storage and for printing to the screen and to a printer. Clearing the routines from memory does not disturb any information placed in the graphics page area until a new program is located there or space is reserved for another graphics page; so that it is possible to generate a graph, load another program above the reserved graphics area and enter the reserved graphics page area for the information to be printed.

To print a graph generated by the disk graphics routine, draw the graph and display it on the screen, return to the menu, and exit to BASIC. Then load the screen print utility, *BWDUMP*, execute it and print your graph.

An interesting project for someone out there would be to replace the print subroutine in the disk graphics program with the screen print utility to provide a one-step process for using the DMP 120.

William T. Longe
Pittsburgh, PA

A FAST POKE

Editor:

The following short program should indicate to your readers whether or not their machine will take the "fast poke," *POKE 65495,0*. Simply type it in and *RUN* it.

```
0 CLS 0
1 PRINT "YOUR MACHINE WON'T
TAKE THE FASTPOKE."
2 PRINT@416, "PRESS RESET TO
RESUME OPERATION";
3 POKE 65495,0
4 SOUND 1, 1
5 PRINT@13, "WILL ";
6 PRINT@416
```

Please note that there is a space after "WILL" on Line 5. For further tips on the CoCo, call or write me; maybe I can help you. My address is: P.O. Box 385, 29556, Phone (803) 354-7073.

Joey Staton
Kingstree, SC

BASIC09

Editor:

I have a couple of hints about using BASIC09 that may be of help to some readers.

1) If you're using BASIC09 with FHL O-Pak, you can get more memory by loading BASIC09 *before* you install the Hi-Res screen. You can then type BASIC09 #10K without getting a memory full error.

2) By including the following short program in your workspace, you'll never have to spend time figuring out screen positions again. Instead, just include the line *RUN cursor* (horizontal, vertical), where horizontal and vertical are the desired screen positions.

```
PROCEDURE cursor
PARAM horizontal,vertical:INTEGER
horizontal:=horizontal+$20
vertical:=vertical+$20
PRINT CHR$($02)+CHR$ (horizontal)
  +CHR$(vertical);
END
```

Now, can someone out there help me? I have the HJL keyboard and can't seem to get the function keys to work in a BASIC09 program (or in OS-9 in general, for that matter). Does anyone know the reason? Write to me at 115 Columbia Turnpike, 07932.

John Ruzicka
Florham Park, NJ

INFORMATION PLEASE

Editor:

I have a technical question concerning power supplies. As you no doubt know the UK domestic power supply is 240v,50Hz. Can I run my equipment in UK using a simple transformer like the one which Radio Shack sells, or will I need to transform the frequency to 60Hz as well? My equipment consists of an E board CoCo, which I have upgraded to 64K, twin Tandon disk drives, a Gemini 10X printer, an Amdek Color I Plus monitor and a Radio Shack tape recorder. I am told that the voltage is reduced to 12v DC in the CoCo, but I am not sure whether there are any chips which are frequency dependent even after conversion to 12v. As for the rest of my equipment, does any of it run on 12v DC and, if not, is any of it frequency dependent?

T.A. Pearson
Omaha, NE

Editor:

Help! I just bought a CGP-115 printer with my TRS-80 64K Extended, and I cannot figure out how to print graphics! The manuals do not make this clear to me, and I cannot understand the store's explanation. Do I need some other software? If anyone could help me, I would be eternally grateful! Also, could anyone out there explain the DOS function? I just can't work it out. My address is: 7306 N.E. 140th Place, 98011.

Jean Breen
Bothell, WA

HELPING THE HANDICAPPED

Editor:

I have a problem that I hope that either you or your readers can solve.

I know a handicapped person who is confined to a wheelchair and has limited speech.

I would like to hook a MC-10 to a speech chip and a speaker to his wheelchair battery. I would also like to get a PROM made with the program I will write with BASIC words and phrases that he will need to communicate with others. Also, I would adapt the MC-10 to 12-volt power supply so that it would be portable.

I chose the MC-10 because of the size and cost. I think this adaption could connect through the memory expansion slot.

If any of your readers, authors, or advertisers have any ideas, hints, or other tidbits of information, please let me know. My address is Box 428, 28906. Thank you for your help!

David McLees
Murphy, NC

Editor:

Would you know of anybody who produces a video monitor interface which is *external* to the case of the TRS-80 Color Computer? It seems that everyone is offering items for inside the case, but I don't care to go inside of my machine. My address is 217 Cramer Hall, UMC, 65201.

Robert Levitt
Columbia, MO

MORE RAM

Editor:

The TRS-80 Color Computer has to be the best buy on the market today. Aside from the hardware advantages which we all know so well, this device has generated more popular consumer support than any computer since the Apple II. The number and quality of after-market vendors is just incredible, and the software available is beyond comparison.

How many "toy" computers can boast four major DOS (Disk BASIC, Flex, OS-9, and CP/M), and every computer language you could want? There are gadgets to add almost any capability you need, and great magazines like RAINBOW to help with any problem you may have. But our beloved CoCo is sorely lacking in one respect that I think really needs to be addressed. In a word, MEMORY!

Some will think that 64K of RAM is enough, and I know programmers that do wonders with it. But the latest generation of computers can access almost unlimited memory. These are the machines that are attracting the software vendors. Massive second generation spreadsheets, what-you-see-is-what-you-get word processors, complex Adventure games, and other advanced programming is being developed for these megabyte computers. The CoCo will be left in the dust!

At this time, I would like to challenge all of you who are interested in the future of our computer. Let's develop a system to allow the CoCo to access more than 64K RAM! If the vendors see that this computer can handle the advanced software being developed for other machines, the market and capabilities of the Color Computer will continue to grow!

Stephen Roberson
Chandler, AZ

A PERSONAL LOSS

Editor:

It is with a sense of profound loss that I report the death on June 8, 1984 of Greg Wilson, the publisher of the Australian edition of THE RAINBOW.

Greg had a most distinguished career, being at first an accountant, then an educational administrator. He retired about five years ago at an early age due to continuing heart problems. After a year of moping around the house, during which he built his own computer, his ceaseless energy could no longer be confined.

Several of his letters lauding the Tandy Colour Computer were published in the local computer press, and it wasn't long before he had evolved the embryo of what has become a most organized and well-constructed network of support groups for the Tandy Colour Computer.

Greg understood and cared for people. He absolutely hated to see them being ripped off and he wasn't the least afraid to yell long and loud at Tandy, or anyone else who he thought was doing things against the interests of computer users.

He was very proud — not of his own achievements, which had been many, but of the people who developed their talents through, and sometimes because of, the magazines and publications with which he was associated. His particular 'baby' was a magazine called 'MiCo' which was aimed at users of the MC-10 computer. His greatest thrill, during his last days, was to receive material for publication in that magazine.

It appears that Greg disturbed someone robbing his flat and suffered a heart attack soon after. He will be greatly missed. He was loved and respected by all who knew him. Somehow, when I read his old magazines or run one of the programs he supplied, somehow, he doesn't seem quite that far away.

I'm sure all your readers will join with me in extending to Helga, his wife, and to all those in Greg's family our deepest sympathy.

Graham Morphett,
Editor
Australian RAINBOW

We at THE RAINBOW also wish to extend our sympathies to Greg's family, and to express to all our appreciation for the work he did so well for the magazine and for our Australian readers.

— The Editors

KUDOS

Editor:

I am writing this letter to you because I want to praise this great source of information.

This is where I really started with the CoCo and I think many others have, too!

Congratulations on your work!

Tom Mills
Chicago, IL

ROY'S SCHOOLMATE

Editor:

As you know, THE RAINBOW is the best CoCo magazine available today. I look forward to my new issue every month which I read over several times. I was reading my new issue when I came across a name, Roy G. Biv. I was fortunate enough to meet Roy last year in my chemistry class. Roy is a nice guy once you get to know him, and I hope that Roy will do a feature article in one of your upcoming issues.

Paul Osburn
Stockton, CA

Editor:

The *best* CoCo magazine just got *super, fantastic, complete* and (even more) *wonderful!*

Thank you for the addition of PASCAL.

Robert Dooman
Glenview, IL

BOUQUETS & BRICKBATS

Editor:

I would like to commend two of your advertisers for excellent service. I recently purchased the *Flip-it* disk doubler from Reitz Computer Center. Unfortunately, this method would not work with my system.

When I ordered 20 diskettes from Software Support, three turned out to be hard-sectored instead of soft.

Both companies processed the original orders very quickly. What amazed me was how quickly and fairly both companies handled the problems. I would highly recommend both companies for any future purchases.

Arthur L. Lewis
St. Louis, MO

Editor:

I would like to commend one of your advertisers, Double Density Software, for their excellent service and top quality products.

Like many other novices in the field of data communications, I relied on the reviews and ads in THE RAINBOW to guide my search for a terminal communications program. My search ended with my first call to Double Density's Larry Perry.

Thanks to his technical advice and support, both before and after my purchase (and to the smooth operation and professional features of Double Density's *Color Term +Plus+* Program), I've been able to: access IBM mainframes, information utilities, electronic mail systems, and bulletin boards, all without a single hitch. A friend of mine, who owns an Apple, has yet to find a terminal software supplier who can offer anywhere near the same level of support, even for packages costing several times as much.

I heartily recommend this fine company to all RAINBOW readers.

Richard Woytowich
Staten Island, NY

Editor:

I purchased software from one of your advertisers in your February Issue. Arizona Software of Mesa, Ariz. advertised *Elite*-File* software at a price of $50.95 plus shipping on Page 49. The ad also claimed the prices were "good through Feb. 15, 1984." My order was placed on Feb. 13. Upon receipt of the software, purchased against a Visa card, the charges were $64.95. The same offer was again made in the March issue with identical prices guaranteed until March 15.

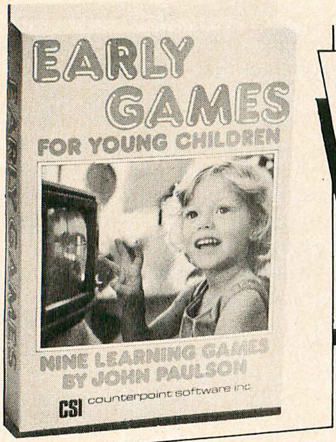
I have attempted to correspond without response from the Arizona Discount Software Company, and at last resort, reporting the situation to you.

I have the highest respect for your publication. I purchase a great deal of material through ads in your magazine and have never had a similar problem.

David G. Kaiser
Virginia Beach, VA

Editor:

I have been involved with the Color Computer since its infancy. Over the years I have seen the base of software grow from nothing to its present excellent level of diversity and quality. THE RAINBOW, I feel, has played an instrumental role in this growth and should be thanked by all CoCo users.



The Best Selling Program for Young Children Now Available for: TRS-80 Color Computer-16K disk or cassette and TRS-80 Models I/III-32K disk or 16K cassette

Nine fun educational games for children ages 2½ to 6

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Educators Endorse: "Early Games can help children learn new concepts, information and skills, and also introduces them to the joys and benefits of home computers."

Peter Clark, Faculty
Institute of Child Development
University of Minnesota

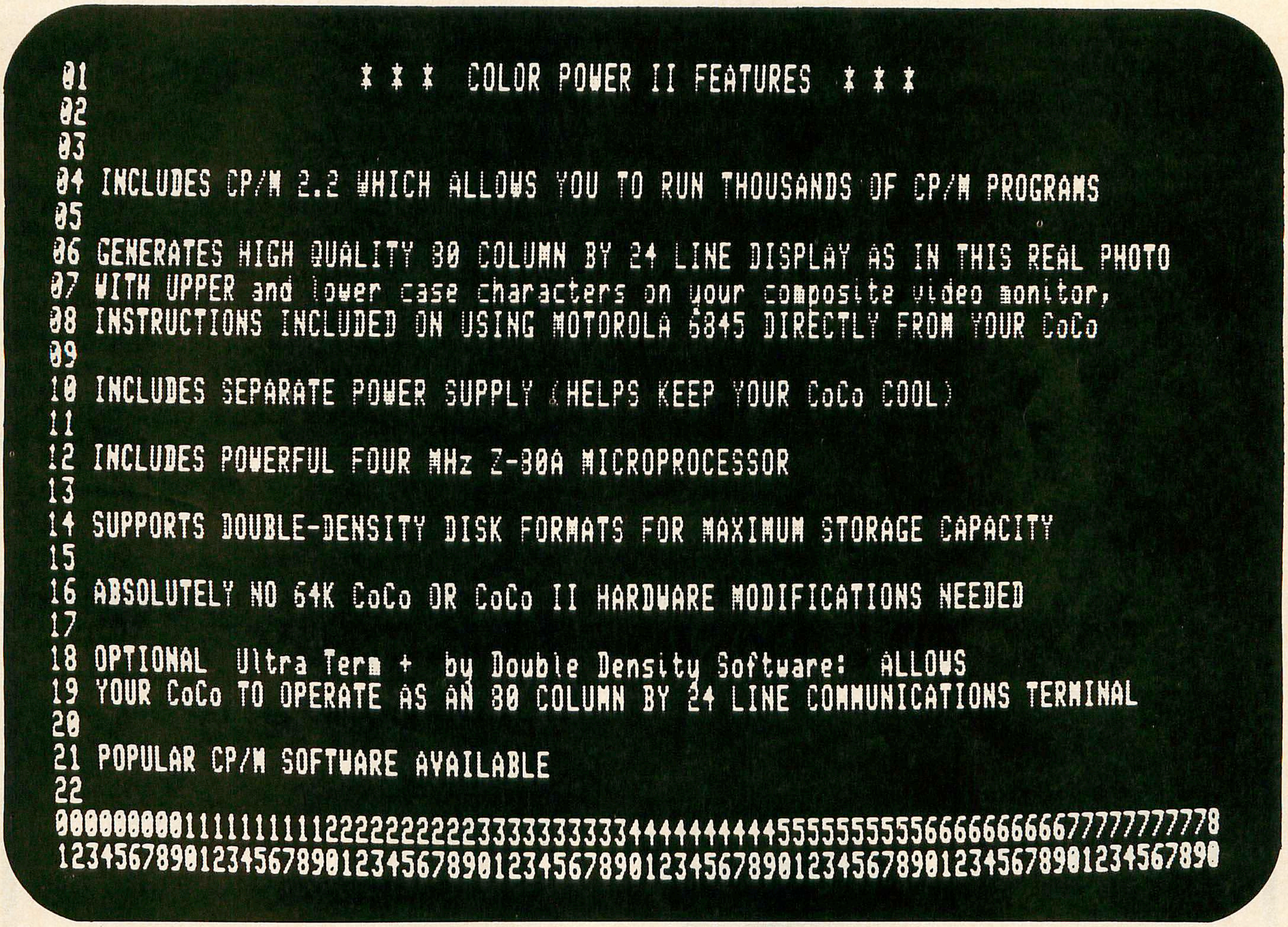
No adult supervision required. The Picture Menu gives children control. They can:

- Match Numbers
- Count Colorful Blocks
- Add Stacks of Blocks
- Subtract Stacks of Blocks
- Draw and Save Colorful Pictures
- Match Letters
- Learn the Alphabet
- Spell their Names
- Compare Shapes

All nine games for $29.95

Color Power II™

Expands Your CoCo to CP/M® 2.2



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01                   * * *  COLOR POWER II FEATURES  * * *
02
03
04 INCLUDES CP/M 2.2 WHICH ALLOWS YOU TO RUN THOUSANDS OF CP/M PROGRAMS
05
06 GENERATES HIGH QUALITY 80 COLUMN BY 24 LINE DISPLAY AS IN THIS REAL PHOTO
07 WITH UPPER and lower case characters on your composite video monitor,
08 INSTRUCTIONS INCLUDED ON USING MOTOROLA 6845 DIRECTLY FROM YOUR CoCo
09
10 INCLUDES SEPARATE POWER SUPPLY (HELPS KEEP YOUR CoCo COOL)
11
12 INCLUDES POWERFUL FOUR MHz Z-80A MICROPROCESSOR
13
14 SUPPORTS DOUBLE-DENSITY DISK FORMATS FOR MAXIMUM STORAGE CAPACITY
15
16 ABSOLUTELY NO 64K CoCo OR CoCo II HARDWARE MODIFICATIONS NEEDED
17
18 OPTIONAL  Ultra Term +  by Double Density Software:  ALLOWS
19 YOUR CoCo TO OPERATE AS AN 80 COLUMN BY 24 LINE COMMUNICATIONS TERMINAL
20
21 POPULAR CP/M SOFTWARE AVAILABLE
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Plug Color Power II into the expansion port of your 64K CoCo or CoCo 2, plug your disk controller into Color Power II, and insert our disk into your drive. You are now ready to run thousands of CP/M programs such as WordStar®, MailMerge®, SpellStar®, and StarIndex™ and to run Ultra Term + to create an 80 column by 24 line terminal.

Your CoCo is now a CP/M compatible computer that includes CP/M 2.2 and generates an 80 column by 24 line display on your 80 column monitor with upper and lower case characters.

Introductory Prices:

Color Power II (includes CP/M 2.2)	**$329.00**
Add Ultra Term +	**$ 55.00**
Color Power II plus WordStar® & MailMerge®	**$498.00**
Add SpellStar® and StarIndex™ for only	**$ 79.00**

Call or send check, money order, Visa or MasterCard number with expiration date to the address below. N.J. residents add 6% sales tax.

CPU **Color Power Unlimited, Inc.**

1260 Springfield Ave., P.O. Box 606-F, New Providence, N.J. 07974 **(201) 665-9646**

Color Power is a trademark of Color Power Unlimited, Inc.
CP/M is a trademark of Digital Research, Inc., WordStar, MailMerge, SpellStar, and StarIndex are trademarks of MicroPro International Corp.

I think we have entered a new generation of CoCo software. Cognitec's *Telewriter-64* is an example of the excellent applications software available. And the latest games from Tom Mix, such as *Ms. Maze*, are finally bringing arcade action to the CoCo and demonstrate the machines graphics and sound capabilities to their maximum.

I think these and other RAINBOW advertisers deserve a pat on the back for contributing to the success of our favorite computer.

Brett Johnson
Columbus, OH

NEUTRAL WATERS

Editor:

I would like to comment on Mr. Nickols' article, *Adventure Contest Update* on Page 189 of the July 1984 RAINBOW.

Unlike what Mr. Nickols says, the shores of Finland are definitely not Soviet patrolled, nor is the rest of Finland. It would be nice if Mr. Nickols did not make comments about things of which he obviously is misinformed.

Timo Talasmaa
Helsinki, Finland

Editor's Note: We certainly apologize for upsetting any national sensibilities. The term was used loosely and descriptively — no political meaning was intended.

BULLETIN BOARD SYSTEMS

Editor:

We are pleased to announce our BBS, Colorama of North West Jersey is now online.

We will be up seven days a week, 24 hours a day. We are running a Colorama BBS system which features a news section, an upload and large download section. A want-ad section, a shop at home service, E-Mail and much, much more. Our mailing address is: Colorama, 252 RT 46, P.O. Box 337, 07880.

Robert Johnson, Sysop
Vienna, NJ

Editor:

We would like to announce the Dakota Database. The Color-80, number 29 BBS is available 24 hours a day at (701) 281-0233.

We have programs for the CoCo and Model 100 for download, and the board is open to all computer users. There is also an electronic mail section, a mini database, and electronic shopping.

John Steiner
Riverside, ND

Editor:

We have the first OS-9 Bulletin Board System in the Greenville area. The phone number is (803) 288-0613. The hours of operation are 10 p.m.-7 a.m. Mon.-Sun. The BBS name is DLOAD OS-9.

We have upload/download, E-Mail, merchandise, and we support the OS-9 User's Group. Both Radio Shack BASIC and BASIC09 programs for download are available. It's sponsored by the Soft Shop, P.O. Box 878, Mauldin, S.C. 29662.

We are trying to organize a Color Computer Club for Wednesday nights for the Mauldin area. Interested people should leave a message on the BBS or call the "Shop."

Brian Tate, Sysop
Greenville, SC

Editor:

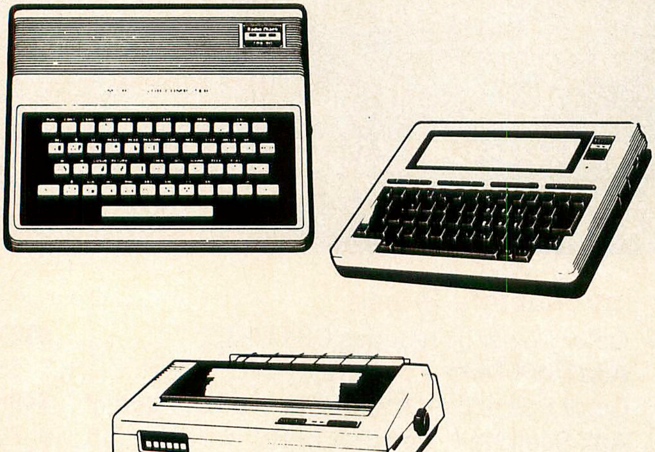
I would like to extend my sincere thanks to all the RAINBOW staff. I've been a subscriber since May 1982, and, let me tell you, we've come a long way together. Keep up the outstanding good work!

I'm writing to let you and your many subscribers know of another CoCo BBS. It is Colorama of Port Jefferson Station. The hours of operation are 6 p.m.-6 a.m., seven days a week, and the number is (516) 331-3718.

I can't wait to see what the years ahead will bring from your fine publication!

John Adkins, Sysop
Port Jefferson Station, NY

TRS-80 COMPUTER DISCOUNTS



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Instead use the revised

DATABASE/MAILER 64
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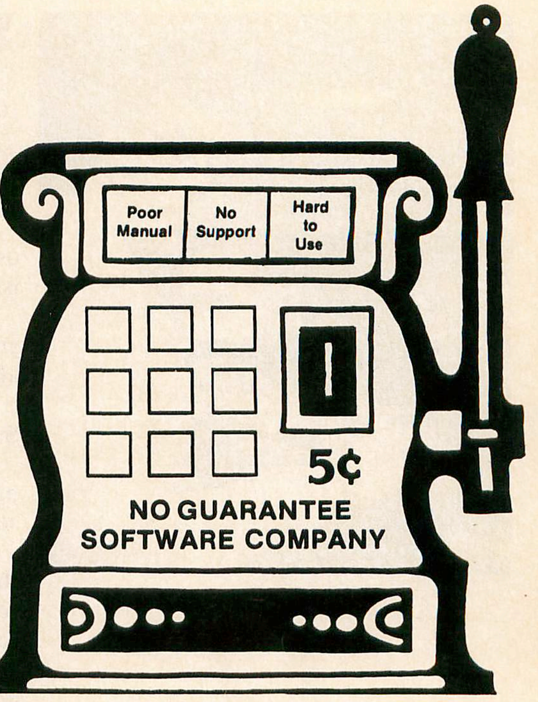
REVISION C

for FAST, EASY single page letters
or 1000's of form letters & labels
with our new



30 DAY MONEY-BACK GUARANTEE!*

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SEAL

ACCOUNTS • INSURANCE • PROPOSALS • BULK MAIL • DENTAL RECALL • CHRISTMAS LISTS • CHURCHES • CLUBS • REALTORS • SALES

- Active menus guide you to valid operations.
- Won't "hang up" your system.
- 32K system allow 68 to 440 records per file.
- 64K system allows 91 to 610 records per file.
- Up to 10 fields, 270 characters/record.
- All user definable with default values - easy.
- Sort any field alpha/numeric, full or partial.
- Adjusts for empty address lines - no gaps.
- Up to 9 line labels with up to 500 copies each.
- Master two column printout with field names.
- Master printout includes date, paging & filename.
- Selective printing by any field or field range.
- Accepts alpha or numeric zip codes up to 10 digits.
- Partial or whole item search by any chosen field.
- Single screen 10 record display by any field.
- Single key entry for hard copy of screen data.
- Fast single page letter writing with wordwrap.
- Embedded commands center, tab and line skip.
- Full screen edit allows delete, insert & change.
- Headings are tabbed, spaced automatically.
- No "Database Adventure" - over 50 page manual.
- Manual includes program operation flowcharts.
- Not needed, but included is user modification section.
- Access up to 4 drives in disk version.

- Create new files from all or part of old file.
- Auto select "special" records for saving to new file.
- Change lengths, add or delete fields of existing files.
- Auto copy identical data to all records in file.
- Combine unfilled files to create new file from old.
- Full memory sense adjusts to your system.
- Disk to tape data file transfer.
- Tape to disk data file transfer.
- Archive files to tape for security.
- 1 key VERIFY ON/OFF for secure copying.
- Interim save allows multiple file copies.
- User friendly error checking.
- Prints sorted disk directory to printer.
- Directory printout fits on disk jacket.
- Copy files/programs between disks.
- 2 key kill of old files/programs on disk.
- Complete file maintenance made easy.
- Fully menu driven for fast, easy response.

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The most complete package available
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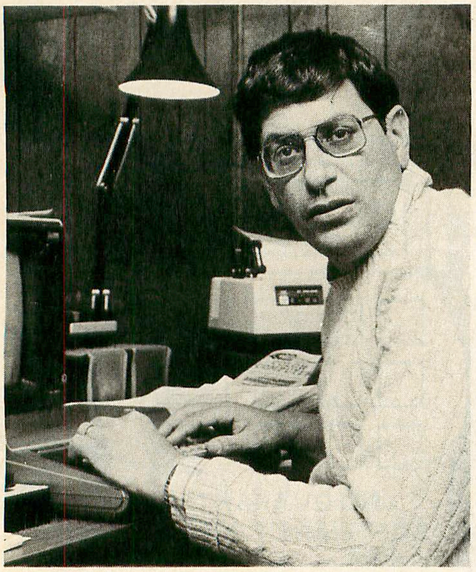

Was RAINBOWfest-Chicago a success? It certainly was! For the first time, it seemed we had enough space — yet we had more exhibitors than ever before, almost 60 of them. As for attendance, there were a little over 10,500 there — a really big, fun and exciting show.

In fact, the Chicago show had a few more in attendance than did New Brunswick — so it is up to you Easterners now to better the Midwest attendance record. You can do it in Princeton, N.J., Sept. 28 through 30 at the Hyatt-Regency Hotel.

RAINBOWfests seem to be getting bigger and better all the time. So, plan to join us this second "season." Details and an order form for tickets are inside this month's issue.

Welcome to our Education Issue! As readers from a year ago may remember, last year's education issue was one of the most exciting that we have ever had — and, it also contained news of the CoCo 2. I thought Fred Crawford did a wonderful job of combining education and the Color Computer 2 (and 64K CoCo) news with his September 1983 cover — of a "blackboard breakthrough."

This September, we have no news comparable to last year's CoCo 2 announcement, but we do have something new. In telling you about it, I would like to set the stage just a bit.

Those of you who follow the words in this space from time to time may be aware that I hold the notion of Reader Service in something less than high regard. The reason is a simple one — I do not see reader service as *reader* service, but as a service to an advertiser and, additionally, as a selling tool for those who hawk advertising space. At the same time, I do not think that Reader Service is of much benefit to the advertiser, either.

In short, as I have said before, Reader Service is really "Magazine Service." It helps the magazine by making the reader think he or she is getting something extra and it also helps the magazine sell advertising space.

In truth, it does not help the reader. For one thing, the reader's expectation is that he or she will get a lot of additional information simply by circling a number on a card or calling a toll-free telephone answering service. Usually, the reader won't get too much additional information — sometimes less information than is in an advertisement — and he or she will have to wait a couple of months for what does finally arrive.

I remember the first time I filled out a Reader Service card. It was from *Byte* and it took about six weeks to get the first response. I'd almost forgotten what I asked about when the responses started to arrive. And some of them never came (more on this later).

From the advertiser's point of view, it usually takes a long time to get Reader Service responses from a company and, often, the reader asks for so many different things that the firm wonders whether the reader is really interested or just wants to get some mail. In the trade, these folks are called "lonely hearts" — all they want is a full mailbox.

And, for that reason, some companies do not respond to Reader Service at all. The reason is that it costs money to mail a response — and the response rate to mailings from Reader Service is astonishingly low.

Those are the reasons that we have never been fond of Reader Service. But, I will admit that, properly handled, Reader Service *can* be a service to the reader. We've come up with a plan which we intend to implement in the next month or so.

We intend to begin inserting a Reader Service form in THE RAINBOW. But this one will be a little different. First of all, it won't be a postage-paid card, but a form on a regular page. Second, we will ask that you send $1 with the form. The reason for this is not to make some money for us, but to determine that the respondent is really interested in hearing about products. Third, we will limit the number of inquiries per form to 15. This means that we will return any forms which have more than 15 responses (we'll send back the $1, too).

On the other side of the coin, we have found a firm which will handle these requests for us on a weekly basis — which means the advertiser will get the labels in quick order. And, we will *require* anyone participating in our Reader Service program to promise to respond to all queries they receive on a timely basis.

The way I look at this, we're "charging" the reader $1.20 ($1 for the service and 20 cents for the stamp) to get information on as many as 15 products. While that isn't a lot of money, it *is* something other than just filling out a card and dropping it in the

Telewriter-64™

the Color Computer Word Processor

- **3 display formats: 51/64/85 columns × 24 lines**
- **True lower case characters**
- **User-friendly full-screen editor**
- **Right justification**
- **Easy hyphenation**
- **Drives any printer**
- **Embedded format and control codes**
- **Runs in 16K, 32K, or 64K**
- **Menu-driven disk and cassette I/O**
- **No hardware modifications required**

THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters.* So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

> *...one of the best programs for the Color Computer I have seen...*
>
> — Color Computer News, Jan. 1982

TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time.* Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

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File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

> *...truly a state of the art word processor... outstanding in every respect.*
>
> — The RAINBOW, Jan. 1982

PROFESSIONAL WORD PROCESSING

You can no longer afford to be without the power and efficiency word processing brings to everything you write. The TRS-80 Color Computer is the lowest priced micro with the capability for serious word processing. And only Telewriter-64 fully unleashes that capability.

Telewriter-64 costs $49.95 on cassette, $59.95 on disk, and comes complete with over 70 pages of well-written documentation. (The step-by-step tutorial will have your writing with Telewriter-64 in a matter of minutes.)

To order, send check or money order to:

Cognitec
704 Nob Street
Del Mar, CA 92014

Or check your local software store. If you have questions, or would like to order by Visa or Mastercard, call us at (619) 755-1258 (weekdays, 8AM-4PM PST). Dealer inquiries invited.

(Add $2 for shipping. Californians add 6% state tax. Allow 2 weeks for personal checks. Send self-addressed stamped envelope for Telewriter reviews from CCN, RAINBOW, 80-Micro, 80-U.S. Telewriter owners: send SASE or call for information on upgrading to Telewriter-64. Telewriter-compatible spelling checker (Spell 'n Fix) and Smart Terminal program (Colorcom/E) also available. Call or write for more information.)

Apple II is a trademark of Apple Computer, Inc.; Atari is a trademark of Atari, Inc.; TRS-80 is a trademark of Tandy Corp; MX-80 is a trademark of Epson America, Inc.

MASTER DESIGN
(C) 1984 By Derringer Software, Inc.

DOES MORE THAN JUST DRAW PICTURES

IT'S A TEXT DESIGNER

Master Design has the ability to generate lettering in the graphics mode from sizes 2 to 32 and in a wide range of styles. Size 2 offers a 42 x 22 line format while size 32 creates letters that take up over half the screen. Lettering can be skinny, bold, textured, tall, drop shadow, raised shadow and in different thickness. There's nine different settings for thickness and nine different settings for creating open lettering.

IT'S A GRAPHICS EDITOR

Take full advantage of hi-res commands including GET, PUT, CIRCLE, PCOPY, PMODE, LINE, BOX, BOX FILL, PAINT and other special features available only with Master Design. Master Design utilizes a "two cursor" concept to allow quick formatting of boxes, lines and special patterns such as dot patterns for shading and diagonal, vertical or horizontal lines for creative backgrounds. You can create designs and use the TEXT designer to label areas or place titles. You can also create mirror images of the display.

COMES WITH A SCREEN PRINT ROUTINE

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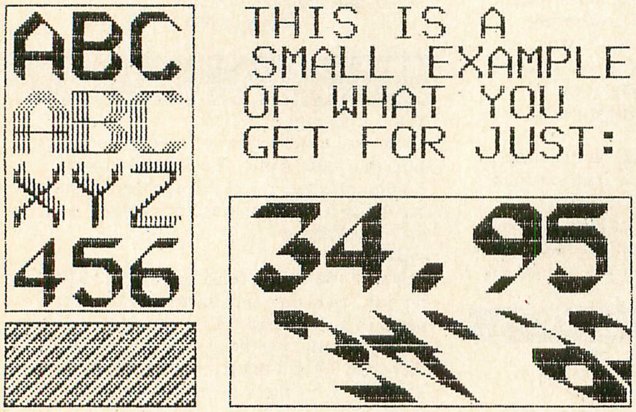

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mail box. For that, we are going to do our best to ensure that you get good information on a *timely basis.*

If you are ready to order a product, I hope that you will forego Reader Service in favor of the telephone or mailing an order direct to a company. If, on the other hand, you want general information on several products, Reader Service may be a good way for you to go.

We hope that the plan will work fairly for all concerned. I think it has a good chance and that we can provide a Reader Service program that is a real *service* to readers.

Based on what I hear at RAINBOWfests and through the mail, many of you have followed our little enterprise here from the beginning — or something close to it. For those who have come along somewhere along the line, you may be interested to know that THE RAINBOW started in part of a spare bedroom in my house, moved into the kitchen and dining room as well, progressed into the basement (which was remodeled as an office); went "movin' on out" to 1200 square feet in a local shopping center and then took on additional space in the shopping center so that it now totals 4800 square feet and completely surrounds the Prospect Post Office.

In fact, one of the biggest problems associated with THE RAINBOW'S growth has been acquiring enough space in which to work. When we moved into our second location, we thought it would surely be big enough for several years. Wrong again, Lonnie!

Within the next four to six weeks, we will break ground for an edifice to be known as the "Falsoft Building." We expect to have some 15,000 square feet available when we move in sometime near the first of 1985. We're really proud of the Falsoft Building and, because of that, will probably bore you with pictures and drawings as it moves along. And, as "dedication day" gets closer, we'll let you know about it: We'd be delighted to show the place off as soon as it is finished.

Another thing we are up to is a new magazine, called SOFT SECTOR for the Sanyo MBC-550 series computers. It made its debut last month and, already, seems to be going very well. If you have a friend with a Sanyo, we'd appreciate your pointing him or her in our direction.

I suppose it is only appropriate that we announce here that we will soon be adding two more books to the list of those we publish. One is the *Rainbow Book of Simulations,* which will contain a host of Simulation-type programs — the winners of our Simulation contest. It will also be available on tape for those who wish to avoid typing the programs in by hand.

Our third book will be *The OS-9 Tour Guide* by contributing editor Dale Puckett and Peter Dibble. Dale, as you know, has already written a book on *BASIC09* and this new offering will tackle OS-9 itself. We intend *The OS-9 Tour Guide* to be a tutorial-style book that will teach OS-9 in much the same way that *Getting Started With Color BASIC* teaches BASIC for the CoCo.

Both books should be available before Christmas.

— Lonnie Falk

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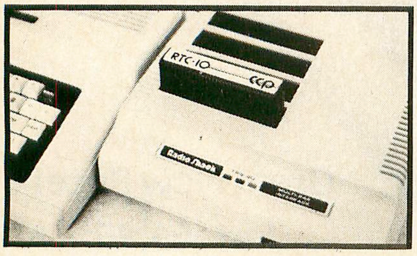

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BUILDING SEPTEMBER'S RAINBOW

Let's Have A Contest . . .
Beginning Right Now . . .
And, The First Winner is . . .

Tim Skene of Montreal, Quebec, wrote us a long while back suggesting we hold what he dubbed "The First Great Rainbow One-Liner Contest." We liked the idea from the start and we've been meaning to launch it with fireworks and fanfare, but it keeps getting shoved onto the back burner. So, skip the hoopla; let's go ahead and do it!

The idea is that some of the most elegant BASIC code is contained in short routines. So, let's see what we can create in the way of a self-contained program with just one line number. After all, aren't the greatest inventions often deceptively simple in design — a pair of scissors, for instance, and other inventions from automotive camshafts to the famed Spectrum Remote Reset. Some great stuff should be possible in one line of BASIC. Musical routines would seem to be a natural.

Tim says we need rules. Personally, I think the world has too many rules already, and I certainly don't want to deprive the CoCo Community of the world's greatest routine simply because of some obscure rule. So, instead of hard and fast rules, let's establish some recommended guidelines — and, at the same time, recommend to the judges that entrants who ignore *too many* of the guidelines must not wish to win.

So, guidelines. The program must work in Extended BASIC and have only one line number and be entirely self-contained: no loading other programs, no calling ROM routines, no ML POKEs. Please don't try to "sneak in" any machine language: It must work as if typed in and run from a cold start. Also, while you will need to remove unneeded spaces, do not pack lines so much that we cannot *LIST* or *LLIST* the *entire* line. Let's keep documentation to the famous 25 words or less — preferably none. A short title for the program might hint at what it is to do, but it should be, for the most part, self-explanatory.

Magazine people have too many deadlines already. Let's not have one. This may become a "standing contest." Format? Well, if you're serious about winning, I suggest the program be on cassette. A printout isn't needed, but wouldn't hurt either. Any explanation and title should be included in a very legible cover letter.

Prizes. Maybe an advertiser or two will read this and offer to donate some prizes. Otherwise, we'll come up with something you'll like. How many winners? Well, as I see it, we'll pick winners as they come in — and if your entry is judged a winner, we'll give you a prize and publish your program in the magazine. By the way, we will consider your act of entering the contest as consent to publish your immortal routine.

That's enough "official stuff." No, let's add that employees and associates of THE RAINBOW *can* enter, too. We won't even make this offer void in Nebraska. The more winners, the merrier. So, off we go . . . and, . . . announcing the first winner! It's Tim Skene, of Montreal, Quebec, whose program, *Spirales,* appears on Page 269 of this issue. Congratulations, Tim! Yours is the best (and only) entry we've received so far.

Speaking of contests, our Adventure judges are pressing onward — but there are *so many* entries. We know you're anxious to hear the results. We'll announce the winners as soon as we can — possibly in our October issue, but we likely will have to wait until November. By the way, our first *Rainbow Book of Simulations* is shaping up nicely and will be published in the early fall.

In keeping with the One-Liner concept, I'll close with my usual one: If you aren't already subscribing, just drop us a line, or call, and we'll deliver THE RAINBOW every month; that's our line.

— Jim Reed

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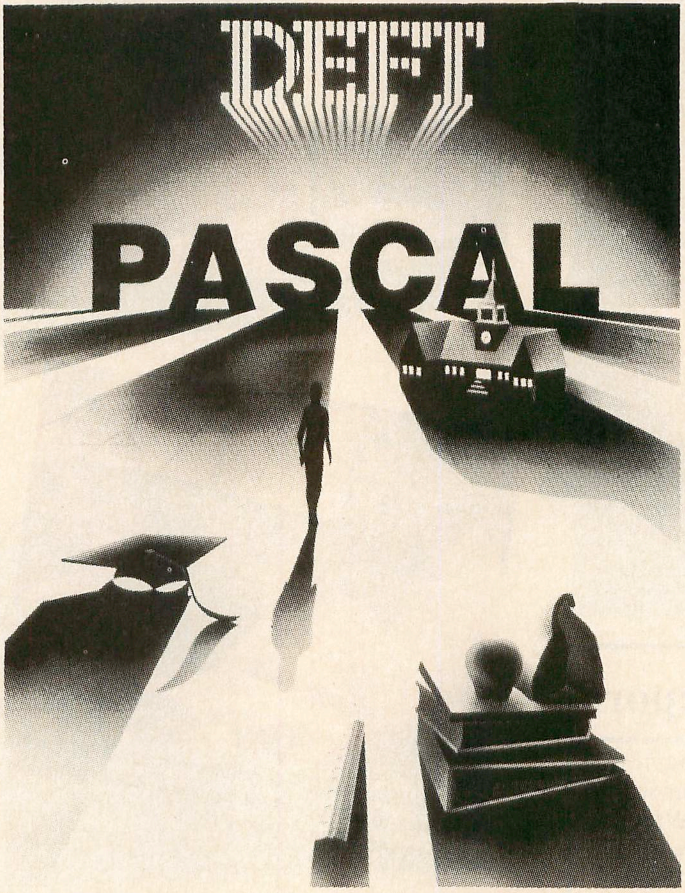

RAINBOW
CERTIFICATION
SEAL

```
TYPE Node = RECORD
    Next : ^Node;
    NodeName : String(15);

TYPE Month = (Jan, Feb,..

MthDys : ARRAY [Month] OF 28..31;

WITH ThisNode DO
    Next := Next^.Next;

READ (A,B);
WRITELN ('RESULT', 3.2E5*SIN(A));

CASE ThisMonth OF ...
```

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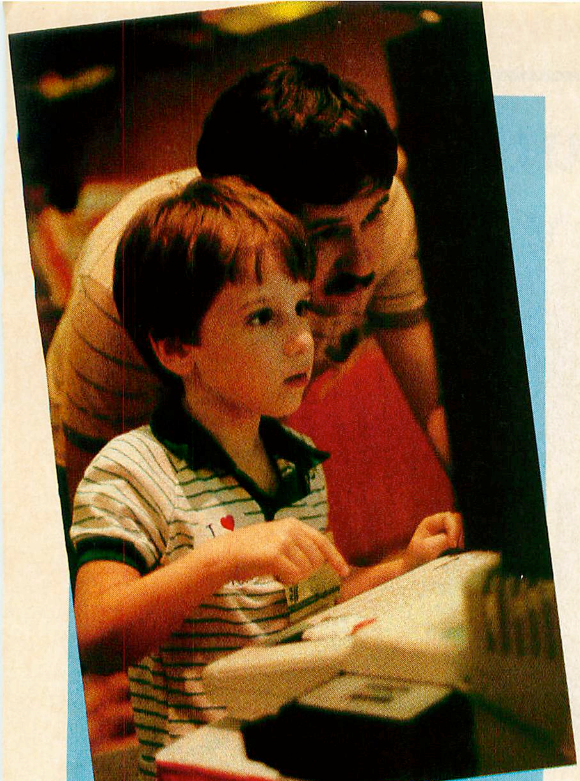


A chip off the old block? Or, is dad getting the lesson?

Special show prices brought out bargain hunters, including these folks at the Skyline Marketing exhibit.

RAINBOWfest Report

The weather was great and the crowd the biggest yet as our second "season" of RAINBOWfests began the same as last year's — with a weekend at the Hyatt Regency Woodfield (Chicago).

It was a time to meet other CoCo enthusiasts and to see the latest in hardware and software. Questions, questions, questions. And, lots of answers, too. Writers, programmers, hardware hackers and RAINBOW readers gathered for a "CoCo Field Day" of scheduled seminars, impromptu hallway confabs and one-on-one dialogue.

CoCo celebrities were out in force. Avid RAINBOW readers should recognize among those attending, this baker's dozen: Jorge Mir, Tony DiStefano, Frank Hogg, Dan Downard, Dale Puckett, Dick White, Michael Plog, Bob Rosen, John Fraysse, Tom Mix, Dennis Kitsz, Marty Goodman and Paul Searby.

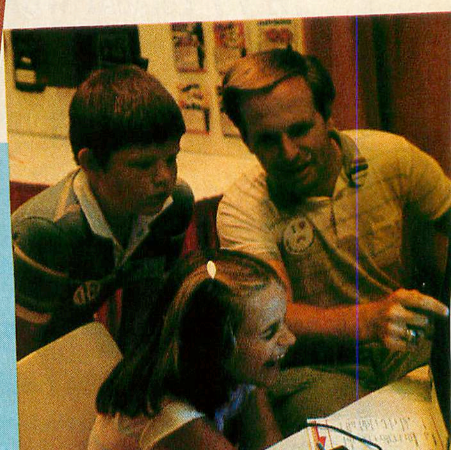
Same place, new time next year! Mark your calendar for May 17-19, 1985. In the meantime, there's our Princeton, N.J., RAINBOWfest, Sept. 28-30, 1984, and Irvine, Calif., (L.A. area), Feb. 15-17, 1985. Do join us. You'll find, just as we have, that it's a delight to match voices and faces with familiar names at RAINBOWfest.

—Jim Reed

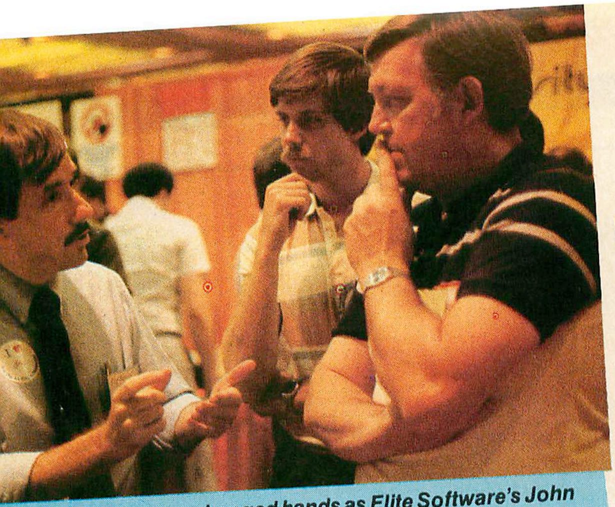
Our KISSable OS-9 columnist, Dale Puckett, autographed copies of his new book with the able assistance of Arlene Don.

The Rainbow's hardware specialist Tony DiStefano came from Laval Quest, Quebec, and helped out in the Micro R.G.S. booth.

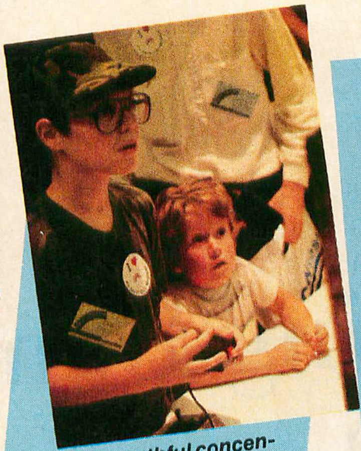
Tandy's director of market planning, Ed Juge (left), was breakfast keynoter. Joining him on the dais was Dick White, Rainbow contributing editor.



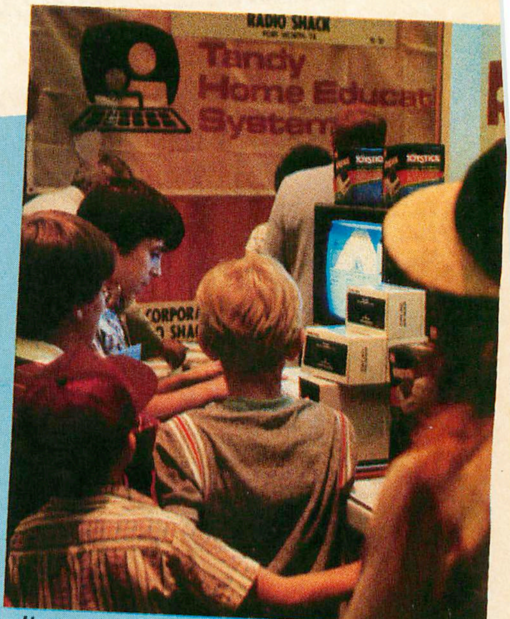
Airline pilot and CoCo author Dave Hooper and his daughter, Sharon, share a giggle while Rainbow games consultant Patrick Downard looks on.



Information changed hands as Elite Software's John Waclo (left) provided some answers.



A study in youthful concentration at the Tom Mix booth.


RADIO SHACK
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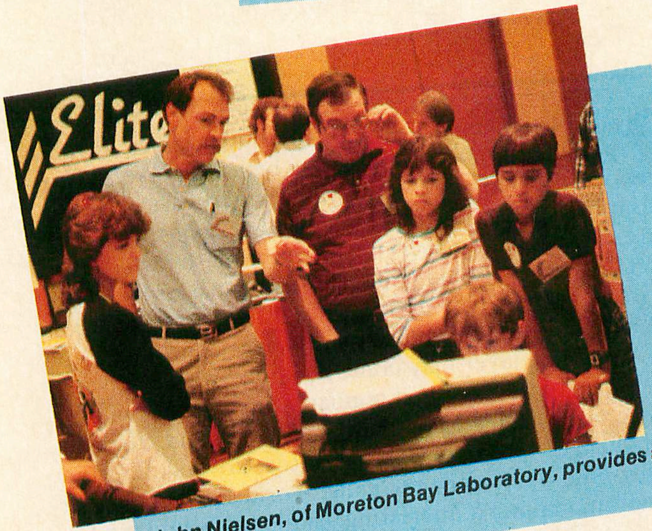
It may say Tandy Home Education Systems, but it looks like the Sands of Egypt.

Dennis Derringer explains a feature of his Pro-Color-File.



John Nielsen, of Moreton Bay Laboratory, provides a family tutorial.

Among the wares drawing a steady crowd at the MichTron booth were back issues of RAINBOW ON TAPE.

Radio Shack
Radio Shack
TRS-80

The Radio Shack exhibit dominated the exhibit hall entranceway.

Role Playing Games Are *Not* Computer Games

By George Firedrake and Art Canfil

Role playing games are *not* computer games. A role playing game is an interaction between players, who operate characters, and a game master, who runs the world in which the adventures occur. Most of the play is verbal exchange. The players tell the game master what their characters want or intend to do. The game master then tells them if they can or may do it or, if not, why not and what might happen instead. Much time is spent consulting rule books. A game player may come equipped with a suitcase full of books to be consulted regularly during game play.

The game master creates the game world and stocks it with challenges, puzzles, traps, hazards, adversaries, and surprises. She or he runs the game world fairly and with imagination, making it interesting, challenging, and fun for the players. The game master has, and frequently consults, many rule books.

The players play their characters *as the characters are.* That's the idea: role playing. Get into the role. Play the character as if the character has a life of her, his, or its own. If your character is a barbarian warrior of average intelligence, act like a barbarian warrior of average intelligence. If your character is a rogue, play the part. If your character is a hobbit, be a hobbit. You might even be a wizard, an elf, a dwarf — play the role!

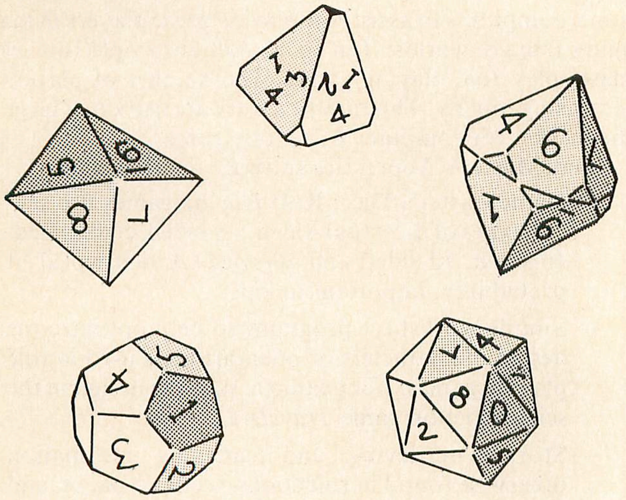
At its best, a role playing game is interactive storytelling in which everyone contributes to the telling, or improvisational theater, spontaneously created by the interplay of game master and game players. Players and game master control and play characters within the rules of the game system.

Most rule systems use dice to determine the outcome of events. A character has many skills. For each skill, a character has a success percentage that determines the probability of success or failure under normal conditions. The game master may increase or decrease this probability if conditions are unusual.

Dice might be used to find out whether something happened or didn't happen. Did a character successfully open a door, or find a hidden object, or hear a monster sneaking up behind her or him? Roll dice to find out.

(George Firedrake, a.k.a. Bob Albrecht, is one of the most prolific authors in the microcomputer world today. A specialist in writing for beginners, he is author of numerous books including TRS-80 Color BASIC. *Art Canfil enjoys designing games and writing. He is co-author of* Taipan: A Game In Context.*)*

Dice are used to determine success or failure in using weapons. If a weapon attack is successful, dice are used to determine how much damage is inflicted. If a character can use magic, dice are used to determine whether a spell is cast successfully and what its effects are. In playing a game, you will spend much time rolling dice and interpreting the results of a roll.

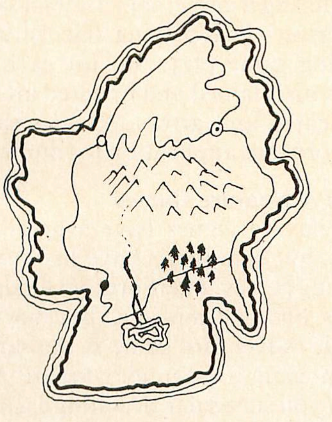


The Game World

Role playing games are usually played by people sitting around a large table. To help players visualize the game world, the game master may use a *game board.* A game board might be simply a large sheet of paper on which the game master reveals portions of the game world as the characters, run by the players, make their successful explorations. As the game progresses, more and more of the game master's world becomes visible on the game board.

And what might that be?

> A dungeon — a network or labyrinth of rooms, or caves, or whatever fiendish structure the game master contrives. Enter at your own risk — you might find monsters to flee or overcome, treasures to acquire (if you can defeat the monsters), problems to solve (solve problem, get treasure), or cleverly contrived traps to ensnare the unwary.
>
> A map of a wilderness area in which an outdoor adventure occurs. Of course, many areas are marked as "unknown," "perilous," "No one has ever returned from here," or "Beware! Dragons be here."
>
> A map of a village, town, or city. An adventure might begin in such a place or occur there. Adventurers need provisions, equipment, weapons, knowledge, training, and other things that can be obtained in the places where people cluster.
>
> The floor plan of an inn or tavern, showing all things visible to a character who enters such a place. Where would your character like to sit in the tavern (perhaps away from those trolls over there)? Would your character like to stay at the inn tonight? If so, he or she can go upstairs — the game master draws (or shows a previously drawn) floor plan of the second story, except for that mysterious room in the northeast corner.



The game master knows everything about the game world. Your character can learn about the game world only by exploring, asking questions, taking risks, guessing correctly.

As you walk into the game room, you see several people sitting around a large table. They are obviously having a good time. Curious, you approach. On the table you see a map. You look more closely. Yes, there on the map are several tiny figures. Each figure represents a character run by one of the players. Other figures represent NPCs, non-player characters, controlled by the game master.

It seems that a fight (called a *melee*) is in progress. The adventurers, figures controlled by the players, have been attacked by a bunch of nasties (NPCs) controlled by the game master. The battle rages as you watch. Players reach out and move their figures, roll dice, yell instructions, mutter to themselves. The game master, likewise, manipulates the NPCs. Who will win? Stay, watch, and find out.

The game board is usually populated by lead, plastic, or paper figures that represent the characters controlled by the players and the game master. Hundreds of figures are possible: humans, hobbits, elves, dwarfs, orcs, trolls, intelligent ducks, dragons (or course!), and dozens of other mundane or fantastic creatures.

Players move figures on the game board as a chess player moves chess pieces on the chess board. Your character's position on the game board shows her or his relationship to other characters and what might be possible or impossible in the next few seconds of game time.

Game time is the time experienced by your character in the game world. How long (in game time) will it take for your character to reach the end of the hallway, about 30 feet away? How will other characters move while this is happening? Can your character fire an arrow at that nasty down the hall, or is the line of fire blocked by fellow adventurers?

A fantasy role playing game might last a few hours or a few years. Players might meet once to play one game of three or four hours duration. Players might meet once a week for years. Each week, play continues from where it left off the previous week.

Most players have several characters to play in games, just as an actor might play several roles on stage or screen, or an operatic performer might sing different roles at different times.

However, there is one essential difference. In fantasy role playing, each character has his, her, or its own life which changes according to what happens to the character during a game. Characters become older during game play. A character can even die during a game, sometimes a sad experience for the real life person who is playing that character. Characters change during game play. So, for each character, a character sheet is maintained and updated after each game. As a character learns and grows, so does the character's record. Aha! An obvious application for our friendly CoCo.

Computer-Based Adventure Games

Fantasy role playing games have a great influence on computer games, but computers have had little impact on fantasy role playing games. There are two kinds of computer Adventure games: one deterministic, the other probabilistic.

A deterministic Adventure game is the same each time you play it. Each game is a complex logical puzzle for the player to solve. If you succeed in decoding a game, you move on to another game, perhaps more difficult. A game may take a few hours to solve, or much longer.

A probabilistic game is probably different each time you play. Events are determined partially by choices made by the player and partially by random choices made by the computer. Outcomes are determined partially by the player's skill and partially by luck. You create a character who explores a dungeon or other computer-contrived universe. You make decisions for your character who enjoys, or suffers, the consequences of your decisions. Play and see what happens. Play again. Your character, or another character of your design, will probably experience a different sequence of events, even if you make the same decisions as before.

We have received several adventures from Owls Nest and Prickly-Pear. We'll playtest them and tell you about them.

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GameMaster's Apprentice — The Books

Computer Adventure games are perhaps the most sophisticated of computer games. However, they fall far short of the richness and complexity of a role playing game conducted by a human GameMaster. It is puzzling that software designers and publishers have not developed software for home computers to assist role playing game players in managing fantasy worlds. Ten to 15 million people (our estimate) play role playing games. The number of players is increasing rapidly. This may be a software market as large as the market for computer Adventure games.

GameMaster's Apprentice software might include:

- GameMaster's Dice. Role playing games use several types of dice: four-sided, six-sided, eight-sided, 10-sided, 12-sided and 20-sided. A rich world of probability, important to kids.
- Simple worksheet programs to help optimize the design of characters or other artifacts used in role playing games. For example, starship design in the science fiction game *Traveler*.
- Storing, retrieving, and managing information otherwise found in rulebooks, scenario packs, and other literature of role playing games. For example: Character records, prices and specifications of weapons, wages and prices in the city of Myboro in Wundervale, descriptions of magic spells, hard to remember rules and anything else that must be looked up during game play.
- Programs to generate pronounceable random names for characters, according to a user selected consonant vowel structure.
- Programs to automate time-consuming game mechanics. For example, a conflict between two characters or a melee involving several characters.
- Names, addresses, and phone numbers of players, game masters, game publishers, game and hobby stores, and so on.

Fantasy game worlds can include everything known about real life, plus anything a player or game master can imagine.

We are writing books and software, first for the CoCo, then for other computers. Our progress will be chronicled on these pages. Although written for children, these books will not be too difficult for adults.

Taipan: A Game In Context

If you have read *Tai-pan* by James Clavell, or *Dynasty* by Robert S. Elegant, you know something about the exotic "China Trade" of the 19th century.

European and American military power had opened trade doors to China and Japan. Immense fortunes could be made by daring, adventurous men without ethical principles to hinder them. The China Traders were such men. They called themselves tai-pan.

Tai is Chinese for great or big or even supreme. Pan means leader or boss. Thus, a tai-pan is a big boss or great leader or perhaps supreme leader. Even today, the term is used for the heads of trading firms from Hong Kong to Singapore (read Clavell's *Noble House*, the sequel to *Tai-pan*).

In the China Trade, the greater the risks, the greater the profits. The risks were more awesome than mere financial gain or loss — there was always a strong possibility of sudden unnatural death.

The China Trader had to contend with pirates, the triads (Chinese secret societies), and the vagaries of Mother Nature. But they dared to do so, and great fortunes were made and lost.

This is the context in which we will build a computer game. No Simulation game can take everything in a setting or environment into account. Think of the problems in creating a game in the China Trade context: the attitudes, behavior, economic and political power of thousands of people, the distribution of wharf rats throughout Asia, tides, weather conditions, what's happening elsewhere in the world, and so on.

Obviously, we can't put every factor into a single Simulation game. Instead, we design a game that, when you play it, it *feels as though* these factors are part of your experience. In a well-done game, you will get caught up in the mystique. You will find yourself playing the role.

> ***"Motivating the player is the key to any good game. You don't have to possess a degree in psychology to know some of the things which motivate people."***

How? First, we can include a number of *common* events, such as bad weather, problems with pests, and pirate attacks, as fairly regular situations. Second, we can create a number of rare events, such as random robberies, confiscation of cargo by port authorities, dramatic rises or falls in prices of goods, etc., as representative of the vast number of things which could actually happen in the "real world."

Using the built-in "random number generator" of your CoCo, we can make some events happen quite regularly, while some other situations may not occur more than once in a blue moon, if at all, during any particular game. And we can set the probability of any event anywhere within a broad spectrum of likelihood.

We also need to make the context of the game interactively "realistic." In other words, the player should have a feeling that the "world" of the game reacts like the real world does. For example, the real world constantly seems to present "trade-offs" — situations where we have choices between two or more alternatives, each of which has advantages and disadvantages.

If you are on foot and need to cross a road against heavy traffic, you might have two choices: One choice might be to jaywalk across the road. The other option might be to go down two blocks to a pedestrian overpass and cross there. With the first choice, you might cross the road much more quickly, thus saving some of your precious time — but you risk not only getting a citation from a police officer, but getting killed as well. With the second choice, you cross the road legally and safely — but use up more time.

Now, add another factor: urgency. Suppose you have just been bitten by a poisonous snake, and the nearest hospital was across the road. Would you jaywalk or take the overpass? Or what if you had all the time in the world that day. Which route then?

In a Contextual Computer Game, we can vary this factor of urgency. We can also vary the danger of the traffic, the pedestrian's ability to dodge cars, and even the safety of the overpass! Trade-offs — they're vital factors in Contextual Computer Games, and we'll use them in *Taipan*.

Motivating the player is the key to any good game. You don't have to possess a degree in psychology to know some of the things which motivate people. The desire for power, a lust for money, the drive for gaining respect, the pleasure of accomplishing something difficult — all these are common motivations. In *Taipan*, we are going to motivate the player with a combination of greed and pride.

Greed is vital, because only with this can the player fit into the role of a taipan. That's what the player will be, a taipan. You may wonder how real greed could be generated in a mere game — after all, there's no real money involved. If you're thinking this, then just try to remember the last time you played Monopoly. After playing for a few minutes,

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didn't you get just a *little* greedy? If not, you're the exception, and maybe you didn't have much fun!

But there's a vital factor here that can't be overlooked by any game designer: in a game (and maybe in life?), wealth, power, or any other reward, doesn't taste so sweet unless there was a struggle to gain it. What would be the purpose of playing Solitaire with all the cards in the deck face up? There has to be uncertainty, conflict, and obstacles to overcome for any reward to actually feel like a reward.

So, in our game, we've got to make the player struggle to satisfy greed. That struggle, if successfully carried out, will result in pride of accomplishment.

Difficulty

The degree of difficulty is perhaps the most troublesome factor of all. A game designer has to get it just right. Too hard to play, and everyone hates the game. Too easy, and people despise it for being trivial. And everyone has different standards! It looks as though any game, at best, would appeal only to a certain segment, doesn't it? Not necessarily; by using the principle of trade-offs properly, a single game can be a sort of "one-size-fits-all" proposition.

Tai-pan is a game anyone who can read and understand words and numbers, and can poke keys on a CoCo, has a good chance to win. It is also a game in which a Ph.D. with degrees in Asian studies, computer science, and accounting — will stand a chance of losing.

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The Old Fashioned Clock

By Joseph S. Paravati

Living in a digital world can have some disadvantages. For instance, some children can have trouble telling time on a good old-fashioned round clock. This was the case with my young daughter, and so the *Clock* was born.

Clock begins with a title page and after some instructions, the clock is drawn on the screen with a background of random colors. The time is shown and you must type in the correct time. For instance, if the time is five minutes after five, you type in 5:05 (do not forget the colon).

If you get the correct time, another time will be shown. If you type the wrong time, the computer will not show another time but will give you a chance to study your mistake. You then hit any key to continue. After 10 tries the computer displays your score and you can then continue.

Clock is very colorful and it is enjoyable to watch the computer draw the program. As it is written, the program needs 32K ECB memory. If the title page is removed and REM lines deleted I believe it will run on 16K ECB.

At first my daughter was only getting two or three out of 10 right. Now she usually gets eight to 10 right. I hope you find the *Clock* useful and enjoyable.

(Joseph S. Paravati, now retired, was an electronics troubleshooter for the New York City Bus Company. He is a self-taught computer hobbyist who started programming in December 1981 in order to occupy his spare time and give his three children a head start with computers.)

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The listing:

```
10 ' *TIME/OLD FASHIONED CLOCK*
BY JOSEPH S. PARAVATI JR.& SR.
              8/83
20 'GOSUB TO CHAR.GEN.SUBROUTINE
30 GOSUB 5000:GOSUB5640:R=RND(-T
IMER)
40 ' INITIAL SET UP
50 CLS:PRINT "*TIME ON AN OLD FA
SHIONED CLOCK*";:PRINT STRING$(3
2,"*");
60 PRINT "THIS PROGRAM WILL HELP
 YOU TO   LEARN TO TELL TIME ON
A REGULAR,ROUND TYPE CLOCK. WHEN
 YOU HEAR THE CLOCK'S 'TIC TOC'
YOU TYPE  IN THE TIME."
70 PRINT"TYPE IN AND <ENTER> YOU
R ANSWERSAS ON A NEW TYPE CLOCK.
 IF THE  TIME IS 12 O'CLOCK YOU
WOULD    TYPE 12:00. 5 AFTER 5 W
OULD BE  5:05. YOU CAN CHANGE YO
UR ANSWERBEFORE PRESSING <ENTER>
, JUST   PRESS THE '<-' (BACK-AR
ROW)."
80 PRINT @489,"<PRESS ANY KEY>";
90 IF INKEY$="" THEN 90
100 CLS:PRINT"AS YOU TYPE EACH N
UMBER (DON'T  FORGET THE ':') WA
IT FOR A TONE TELLING YOU THE CO
MPUTER HAS    RECEIVED YOUR NUMB
ER. IF YOU GETTHE TIME RIGHT THE
 COMPUTER WILLAUTOMATICALLY GIVE
 YOU ANOTHER  TIME TO FIGURE OUT
."
110 PRINT"IF YOU GIVE A WRONG AN
SWER YOU  WILL HAVE TIME TO STUD
Y THE     CLOCK TO SEE WHERE YOU
 WENT     WRONG. PRESS <ANY KEY>
 TO GET   ANOTHER TIME. AFTER EV
ERY TEN   TRIES A SCORE FOR THE
TEN TRIES WILL BE SHOWN.";
120 PRINT" TO END PROGRAM   PRES
S <SHIFT> AND <CLEAR>."
130 PRINT @489,"<PRESS ANY KEY>"
;
140 IF INKEY$="" THEN 140
150 CLS:PRINT @232,"WHAT'S YOUR
NAME?":PRINT"    (NO MORE THEN 7
 LETTERS)":INPUT NA$
160 IF LEN(NA$)>7 THEN 150
170 IF LEN(NA$)=0 THEN NA$="????
```

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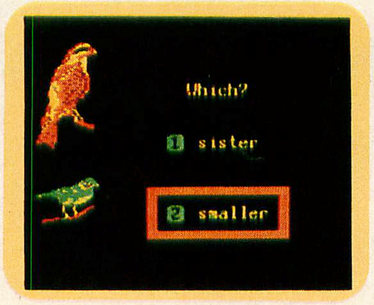
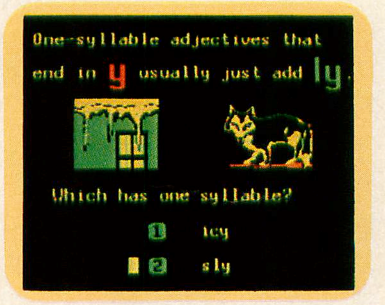

Which?
1 sister
2 smaller


One-syllable adjectives that end in y usually just add ly.
Which has one syllable?
1 icy
2 sly

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190 ' MINUTE MARKS
200 X=128:Y=80:R=80
210 FOR D=0 TO 360 STEP 6
220 A=(270+D)/57.29577951
230 Q=INT(R*COS(A)+128.5)
240 W=INT(R*SIN(A)+80.5)
250 IF D/30=INT(D/30) THEN COLOR
 8 ELSE COLOR 6
260 LINE(X,Y)-(Q,W),PSET
270 NEXT D
```

```
280 ' CLOCK OUTLINE & BACKROUND
290 C$="R80F40D60G40L80H40U60E40
"
300 DRAW "C7BM88,10"+C$
310 CL=RND(7):IF CL<6 THEN 310
320 R=RND(100)
330 PAINT(128,188),CL,7:IF R>50
THEN PAINT(128,188),5,7:CL=5 ELS
E 340
340 CIRCLE(128,80),76,7,.9
350 PAINT(128,80),5,7
360 CIRCLE(128,80),76,5,.9
370 ' NUMBER SET UP
380 COLOR 7
390 A$="12":B$="BM118,26":GOSUB
5090
400 A$="1":B$="BM154,32":GOSUB 5
090
410 A$="2":B$="BM180,52":GOSUB 5
090
420 A$="3":B$="BM194,86":GOSUB 5
090
430 A$="4":B$="BM182,120":GOSUB
5090
440 A$="5":B$="BM154,138":GOSUB
5090
450 A$="6":B$="BM124,146":GOSUB
5090
460 A$="7":B$="BM96,136":GOSUB 5
090
470 A$="8":B$="BM68,118":GOSUB 5
090
480 A$="9":B$="BM54,86":GOSUB 50
90
490 A$="10":B$="BM66,52":GOSUB 5
090
500 A$="11":B$="BM86,32":GOSUB 5
090
510 ' CHANGE TO SPECIAL COLORS
520 PMODE4:SCREEN1,1
530 PMODE3
540 ' GRAPHIC PRINTING
550 A$="WHAT":B$="C8BM10,20":GOS
UB 5090
560 A$="TIME":B$="BM200,20":GOSU
B 5090
570 A$="IS":B$="BM14,140":GOSUB
 5090
580 A$="IT ?":B$="BM200,140":GOS
UB 5090:A$=""
590 IF CL=5 THEN COLOR5:LINE(0,1
56)-(255,191),PSET,BF
600 ' START OF HANDS ROUTINE
610 L=RND(360):IF L/6<>INT(L/6)
THEN 610
620 S=RND(360):IF S/15<>INT(S/15
```

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```
) THEN 620
630 IF L=360 AND S/30<>INT(S/30)
 THEN S=S-15
640 IF L<>360 AND S=L THEN S=S-1
2:GOTO 680
650 IF L<>360 AND L>300 AND S/30
<>INT(S/30) THEN S=S+39 ELSE IF
L<>360 AND L>300 AND S/30=INT(S/
30) THEN S=S-6:GOTO 680
660 IF L<>360 AND L>174 AND S/30
=INT(S/30) THEN S=S-15
670 IF S/30<>INT(S/30) AND L<>36
0 AND L>0 AND L<96 THEN S=S-15
680 SOUND 30,2:SOUND 150,3
690 X=128:Y=80:R=50:R1=30
700 CIRCLE(X,Y),2,5,.9
710 A=(270+L)/57.29577951:B=(270
+S)/57.29577951
720 Q=INT(R*COS(A)+128.5)
730 Q1=INT(R1*COS(B)+128.5)
740 W=INT(R*SIN(A)+80.5)
750 W1=INT(R1*SIN(B)+80.5)
760 PMODE4:SCREEN1,1:LINE(X,Y)-(
Q,W),PSET
770 LINE(X,Y)-(Q1,W1),PSET
780 PMODE3
790 S1=INT(S/30):IF S1=0 THEN S1
=12
800 S$=MID$(STR$(S1),2)
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```
810 L1=L/6:IF L1=60 THEN L1=0
820 L$=MID$(STR$(L1),2)
830 IF L1<10 THEN L$="0"+L$
840 COLOR5:LINE(90,190)-(166,174
),PSET,BF:COLOR8
850 U$=S$+":"+L$:B$="BM96,188":D
RAW B$
860 IF V$="" THEN SOUND90,1:FOR
T=1 TO 460:NEXT:SOUND 70,1:FOR T
=1 TO 460:NEXT
870 K$=INKEY$:IF K$="" THEN 860
880 IF K$=CHR$(92) THEN 1160
890 IF K$=CHR$(8) THEN V$="":COL
OR 5:LINE(90,190)-(166,174),PSET
,BF:COLOR8:GOTO 850
900 IF K$<>CHR$(13) THEN A$=K$:V
$=V$+K$:B$="BM+0,+0":SOUND200,2:
GOSUB 5090
910 IF K$=CHR$(13) THEN 920 ELSE
 870
920 IF V$=U$ THEN RT=RT+1 ELSE W
G=WG+1
930 IF V$=U$ THEN A$="GOOD WORK
"+NA$+"!":SOUND150,5:B$="BM8,170
":GOSUB 5090 ELSE A$="SORRY! THE
 TIME IS":SOUND1,4:B$="BM6,170":
GOSUB 5090:COLOR 5:LINE(90,190)-
(166,174),PSET,BF:COLOR8:A$=U$:B
$="BM96,188":GOSUB5090
940 IF U$<>V$ THEN K$=INKEY$:IF
K$="" THEN 940
950 IF K$=CHR$(92) THEN 1160
960 IF U$=V$ THEN FORT=1 TO 500:
NEXTT
970 COLOR CL:LINE(4,156)-(254,19
0),PSET,BF
980 PMODE4
990 COLOR0:LINE(X,Y)-(Q,W),PSET
1000 LINE(X,Y)-(Q1,W1),PSET
1010 COLOR5
1020 V$=""
1030 ZZ=ZZ+1
1040 IF ZZ=10 THEN GOSUB 1060:ZZ
=0:RT=0:WG=0
1050 GOTO 610
1060 'SCORE ROUTINE
1070 PMODE 3
1080 A$="YOUR SCORE IS:":B$="BM8
,170":GOSUB 5090
1090 A$=STR$(RT)+" RIGHT "+STR$(
WG)+" WRONG":B$="BM0,190":GOSUB
5090
1100 K$=INKEY$:IF K$="" THEN 110
0
1110 IF CL=5 THEN CL=6 ELSE IF C
L=6 THEN CL=7 ELSE IF CL=7 THEN
CL=5
1120 IF K$=CHR$(92) THEN 1160
1130 COLOR CL:LINE(0,156)-(255,1
91),PSET,BF
1140 RETURN
1150 ' END
1160 CLS:PRINT @230,"GOOD BYE "N
A$" !":PRINT:PRINT:PRINT:END
5000 ' ***CHRACTER GEN.<2>***
      **SUBROUTINE***
5010 '
5020 ' SUBROUTINE MAIN PROGRAM
BY J.S.PARAVATI       DATA FROM
TRS-80 NEWS  4/82
5030 '
5040 DIM X$(48),Y$(48)
5050 FOR N=1 TO 48
5060 READ X$(N),Y$(N)
5070 NEXT N
5080 RETURN
5090 DRAW "S8"+B$
5100 FOR J=1 TO LEN(A$)
5110 FOR Z=1 TO 48
5120 IF MID$(A$,J,1)=X$(Z) THEN
DRAW Y$(Z):GOTO 5140
5130 NEXT Z
5140 NEXT J
5150 RETURN
5160 DATA " ","BM+7,0"
5170 DATA "A","U4E2F2D2NL4D2;BM+
3,0"
5180 DATA "B","U6R3F1D1G1NL3F1D1
G1L3;BM+7,0"
5190 DATA "C","BM+1,-0;H1U4E1R2F
1;BM+0,+4;G1L2;BM+6,0"
5200 DATA "D","U6R3F1D4G1L3;BM+7
,0"
5210 DATA "E","NR4U3NR2U3R4;BM+3
,+6"
5220 DATA "F","U3NR2U3R4;BM+3,+6
"
5230 DATA "G","BM+1,-0;H1U4E1R2F
1;BM+0,+2;NL1D2G1L2;BM+6,0"
5240 DATA "H","U3NU3R4NU3D3;BM+3
,0"
5250 DATA "I","BM+1,0;R1NR1U6NL1
R1;BM+4,+6"
5260 DATA "J","BM+0,-1;F1R1E1U5N
L1R1;BM+3,6"
5270 DATA "K","U3NU3R1NE3F3;BM+3
,0"
5280 DATA "L","NU6R4U1;BM+3,+1"
5290 DATA "M","U6F2ND1E2D6;BM+3,
0"
5300 DATA "N","U6F1D1F2D1F1NU6;B
M+3,0"
5310 DATA "O","BM+1,0;H1U4E1R2F1
D4G1L2;BM+6,0"
5320 DATA "P","U6R3F1D1G1L3;BM+7
,3"
5330 DATA "Q","BM+1,0;H1U4E1R2F1
D3G1NH1NF1G1L1;BM+6,0"
5340 DATA "R","U6R3F1D1G1L2NL1F3
;BM+3,0"
5350 DATA "S","BM+0,-1;F1R2E1U1H
1L2H1U1E1R2F1;BM+3,+5"
5360 DATA "T","BM+2,+0;U6NL2R2;B
M+3,+6"
5370 DATA "U","BM+0,-1;NU5F1R2E1
U5;BM+3,6"
5380 DATA "V","BM+0,-6;D2F1D1F1N
D1E1U1E1U2;BM+3,+6"
5390 DATA "W","NU6E2NU1F2U6;BM+3
,6"
5400 DATA "X","U1E4U1;BM-4,0;D1F
4D1;BM+3,0"
5410 DATA "Y","BM+0,-6;D2F2ND2E2
U2;BM+3,6"
5420 DATA "Z","NR4U1E4U1L4;BM+7,
6"
5430 DATA "1","BM+1,0;R1NR1U6G1;
BM+6,+5"
5440 DATA "2","NR4U1E1R1E2U1H1L2
G1;BM+7,+5"
5450 DATA "3","BM+0,-1;F1R2E1H2E
2H1L3;BM+7,6"
5460 DATA "4","BM+3,0;U2NR1L3U1E
3D3;BM+4,3"
5470 DATA "5","BM+0,-1;F1R2E1U2H
1L3U2R4;BM+3,+6"
5480 DATA "6","BM+4,-5;H1L2G1D4F
```

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Signature ____________ Phone ______

```
1R2E1U1H1L3;BM+7,+3"
5490 DATA "7","U1E4U1L4;BM+7,+6"
5500 DATA "8","BM+1,-0;H1U1E1H1U
1E1R2F1D1G1NL2F1D1G1L2;BM+6,0"
5510 DATA "9","BM+0,-1;F1R2E1U4H
1L2G1D1F1R2;BM+4,+3"
5520 DATA "0","BM+1,0;H1U4E1R2F1
D4G1L2;BM+6,0"
5530 DATA "/","U1E4U1;BM+3,6"
5540 DATA "?","BM+0,-5;E1R2F1D1G
2;BM+0,+1;D1;BM+5,+0"
5550 DATA "!","BM+2,+1;U1;BM+0,-
2;U5;BM+5,7"
5560 DATA ".","BM+2,0;U1;BM+5,+1
"
5570 DATA ":","BM+2,-1;U1;BM+0,-
2;U1;BM+5,+5"
5580 DATA ";","BM+1,0;E1U1;BM+0,
-1;U1;BM+5,+4"
5590 DATA ",","BM+2,0;NU1G1;BM+6
,-1"
5600 DATA "'","BM+1,-5;E2;BM+4,+
7"
5610 DATA "-","BM+0,-3;R4;BM+3,+
3"
5620 DATA "+","BM+2,-1;U2NU2NL2R
2;BM+3,+3"
5630 DATA "=","BM+1,-2;R3;BM-3,-
2;R3;BM+4,+4"
```

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A 5 color game that teaches the location of keys. Thirteen levels of difficulty and four speeds challenge both beginner and expert typists. Although not a tutorial, if you can master the highest level and speed, you can type.

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An educational program that uses 'handwriting' to improve spelling for grades 3 - 8. Words can have up to 16 letters, including special characters, accentuated vowels and diagraphs. Input your lessons from the keyboard or cassette, and output results to cassette and/or printer.

Stomp
$24.95

is a unique half-hour board game for 2 - 4 players aged 8 - 80, with very few rules but requiring concentration and strategy to convert your chances to victory. Use joystick(s) and/or optional keyboard. To **Stomp** or not to **Stomp**...? A very entertaining family game!

All programs are on cassette, documented, and use 32K ECB PMODE 3 graphics. Reviews have been or will be published in this magazine.

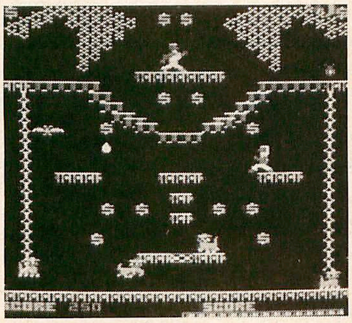
UNDER DEVELOPMENT: GOLF-NET, GOLF-CAP, COCO-CPM and, for model train buffs, SKEDULER.

```
5640 ' TITLE PAGE-DATA FROM
  DRAWING HELPER BY J.S.PARAVATI
5650 DATA 080,072,176,072,080,18
6,176,186,176,072,172,087,172,08
7,136,120,136,120,136,132,176,18
6,172,168,172,168,136,132,012,00
9,056,009
5660 DATA 068,009,108,009,120,00
9,128,009,120,009,120,048,128,00
9,148,036,148,036,168,009,168,00
9,176,009,188,009,228,009,188,00
9,188,048
5670 DATA 188,048,228,048,216,03
0,200,030,216,030,216,024,216,02
4,200,024,200,015,200,024,200,01
5,228,015,228,015,228,009,200,03
0,200,042
5680 DATA 200,042,228,042,228,04
2,228,048,176,009,176,048,176,04
8,168,048,168,048,168,021,168,02
1,148,045,148,045,128,021,128,02
1,128,048
5690 DATA 128,048,120,048,068,00
9,068,015,068,015,084,015,092,01
5,108,015,108,015,108,009,108,04
8,068,048,108,048,108,042,108,04
2,092,042
5700 DATA 084,042,068,042,068,04
2,068,048,084,042,084,015,092,01
5,092,042,056,009,056,015,012,00
9,012,015,012,015,029,015,056,01
5,040,015
5710 DATA 029,015,029,048,029,04
8,040,048,040,048,040,015,120,12
0,120,132,080,072,084,084,084,08
4,120,120,080,186,084,168,084,16
8,120,132
5720 DATA 084,084,172,084,084,17
1,172,171,120,120,124,123,136,12
0,132,123,120,132,124,129,136,13
2,132,129,132,129,132,123,124,12
3,124,129
5740 N=64
5750 PMODE4:PCLS :SCREEN1,1:PMOD
E 3:COLOR7
5760 FOR X=1 TO N:READ C,D,E,F:L
INE(C,D)-(E,F),PSET:NEXT X
5770 PAINT(32,42),7,7:PAINT(88,4
2),7,7:PAINT(148,39),7,7:PAINT(1
92,30),7,7
5780 LINE(124,123)-(132,123),PSE
T
5790 PAINT(124,87),6,7
5800 FOR T=1 TO 25:SOUND T*7,1:N
EXT T
5810 PAINT(128,126),6,7:PAINT(12
4,120),5,7
5820 FOR T=1 TO 1000:NEXT
5830 RETURN
```

CASH MAN

By Bill Dunlevy & Doug Frayer

Exploding with color, racing with fast animation, and roaring with sound, this great non-violent game is destined to be a classic! The review in February's issue of RAINBOW says this: "A Fun Investment" "it is totally unique" "I found it very tough to tear myself away from playing the game long enough to write about it! In short, CASHMAN is one fun game. Buy it."



Dozens of levels and screens (more than FORTY!) offer anyone, from beginner to expert, as much good clean fun as they want! Higher levels include special Mystery Pieces and Expert Puzzle Pieces and Expert Puzzle Screens. Play alone or go for the ultimate challenge of two-player simultaneous competition. Run along the colorful girders, jump across the tremendous chasms, climb the ropes and ladders, or grab a BYRD and fly to get the loot before your opponent does, but watch out! The KATS are on the prowl and your opponent is tossing eggs! Run, jump, climb, or fly to your nearest Color Computer and play CASHMAN!

32K - Tape $27.95
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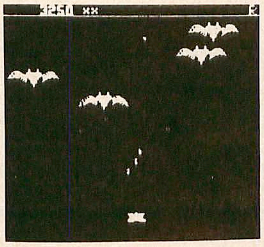
DEMON SEED

By Jeffery Sorenson
& Phillip MacKenzie

All alone in the silence of space, you switch on the view-port to look at the brilliant stars. And then you see THEM: a massive hoard of bat-like aliens, swarming towards you! The ship trembles under the distant explosions of enemy fire. You have only one chance for survival - Fight! As you attempt to defeat each new wave of enemy ships, they only get stronger and faster! If by some miracle you survive the first assault, you find yourself pitted against enemies so swift, powerful, and outright evil that only one name fits them - DEMONS! And if that's not enough, they bring out the heavy artillery - the Mother Ship! Engaging in battle, you see a dark cloud against the stars: another invasion fleet!



Created in the same spirit of the classic arcades games like Phoenix and Galaga, DEMON SEED is a great package of arcade fun and action. Different screens of bats, demons, and special challenge rounds keep the excitement high and the competition stiff!

32K-Tape $27.95
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TIME BANDIT

By Bill Dunlevy & Harry Lafnear

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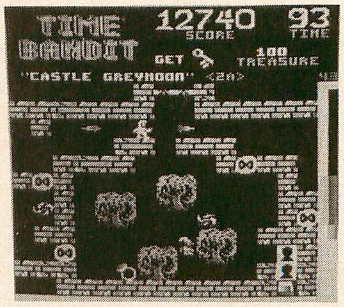

Use the TIMEGATES to travel to the three different Worlds of Time, each containing a multitude of colorful and unique adventuring areas. Visit the medieval dungeons of FANTASY WORLD, recapture the days of yesteryear in WESTERN WORLD, and reach for the stars in FUTURE WORLD. Fight the Evil Guardians: the Looking Lurker, Angry Elmo, Killer Smurphs, and more! Find the Keys and escape with the treasures of time. But hurry - your power is fleeting! Crisp Supergraphics, colorful scrolling landscapes, full animation of a multitude of characters, great sound, and over THREE HUNDRED SCREENS - it's all here! The conquest of time and space awaits!

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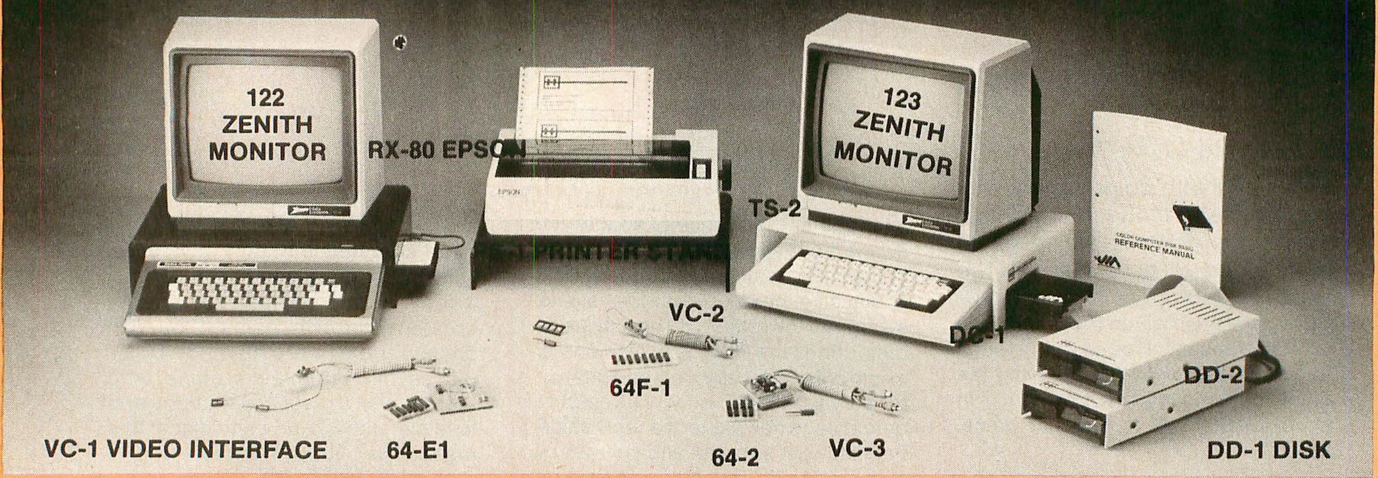

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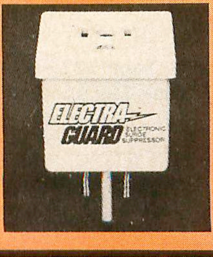

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Everything You Always Wanted To Know About The Color Computer

But Radio Shack Didn't Tell You

By Andy Kluck

Here is the second installment of my compilation of old and new information and techniques involving the Color Computer. This month's article features a method of speeding up tape I/O to about 2700 Baud and one more way to merge cassette programs.

The Memory Almost Full Condition

When BASIC's available free memory is almost used up, a strange condition sometimes occurs. It can occur accidently, such as inside a program, while entering program lines, or on purpose, by:

```
CLEAR 0:CLEAR MEM-50
```

When this happens, there is not enough stack space for BASIC to think straight, and any statement that requires evaluation of a numeric or string expression gives an OM Error. This prevents *SAVE, CSAVE, CLEAR 0, PCLEAR 1,* and just about anything else that could restore control of the system short of *NEW*, from working. If it happens inside a program which uses one too many variables, a simple *CLEAR* may free up enough space to allow a *CLEAR 10:(C)SAVE "HELP!"*. Otherwise, if you don't have the program *CSAVEd*, just about the only way out is to *LIST* or *LLIST* one line (or more if necessary), delete it, make more space (i.e. *CLEAR 10*) and retype the line. To prevent this problem in the first place, it is helpful to monitor the value of *MEM* during a test run of the program and do whatever is necessary (reserve less string space in *CLEAR, PCLEAR* fewer pages, crunch the program, etc.) to keep it above 200.

RENUM

When using *RENUM*, there are several good reasons for saving the program on tape or disk first in case of problems during renumbering, as there are at least two different possible sources of trouble. First of all, *RENUM* without a liberal amount of free memory can cause a wrecked program or system crash, so a *CLEAR 10:PMODE 0,1:PCLEAR 1* is recommended first with long programs. There is also the case of illegal line numbers as in this example:

```
1 GOTO 2
2 GOTO 3
3 GOTO 64000
```

Running this program results in an

(Andy Kluck is an electrical engineering student at the University of Texas at Austin.)

SN Error in 30, since line numbers greater than 63999 are not accepted by BASIC. Attempting to *RENUM*ber with this program also causes an SN Error (without printing the line number since the error occurs in direct mode) and makes the program disappear — just list it. But there may be a way to recover. Saving and reloading the program, or just fixing its line pointers and doing a *CLEAR*, by:

```
EXEC &HACEF:CLEAR
```

at this point will often bring all of it back except some of the line numbers, which are still replaced by internal codes. Now, if you fix the illegal line number and *RENUM* again, the program may be completely restored, if you're lucky.

Adjustments For High Speed Mode

To speed up execution of BASIC programs, it has been suggested that the SAM chip may be set to its Address Dependent mode by *POKE65495,0* and set back to normal speed by *POKE 65494,0* or pressing Reset. Note that not all Color Computers will work in this mode, so it should not be used (or at least be a user option) in programs to be distributed to others. It appears, however, that most of them will work at the high speed if certain modifications are made as described on Page 78 of the January 1983 RAINBOW. Some modifications are almost always necessary to get systems with the disk interface installed to work at the high speed. Also, normal low speed should always be selected during disk access to prevent strange problems that can otherwise occur. In the high speed mode, the processor runs at twice its normal speed when accessing ROM. Since BASIC accesses RAM as it runs, the actual measured speed is less than twice normal, depending on the program. The printer output routine runs mostly in ROM, so the time constants for the Baud rate and carriage return delay generally need to be doubled. Cassette tapes made at the high speed have a data rate of about 2,700 Baud, almost twice the normal rate and five times as fast as the Model I; however, they usually do not load normally even at the high speed because the tape read routine accesses RAM more often than the write routine and, therefore, runs slower and gets out of sync with the tape. But by changing the bytes that control the reading of tapes, it is possible to read tapes made at both speeds at either speed:

To read normal tapes at low speed

```
POKE 143,18:POKE 144,24:POKE 145,10
```

(These are the normal values.)

To read normal tapes at high speed

```
POKE 143,29:POKE 144,30:POKE 145,15
```

To read 2,700 Baud tapes at low speed

```
POKE 143,8:POKE 144,24:POKE 145,4
```

To read 2,700 Baud tapes at high speed

```
POKE 143,13:POKE 144,24:POKE 145,6
```

Tapes made at the high speed may not be readable on all systems, but I have had good luck at a volume level of about eight with the standard recorder. Recently it was suggested that tapes made in the high speed mode could be loaded by using *POKE 65497,0* and no adjustments to locations 143 to 145, but I have found this method less reliable; besides, this disables the dynamic RAM's refresh cycles, sometimes resulting in RAM cells "forgetting" at random. Remember that pressing Reset sets the SAM to its normal speed but does not reset the tape read parameters; this can cause confusion when you reset the computer

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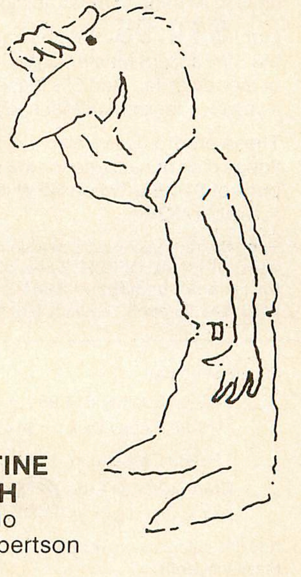

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and forget to adjust these values and all the tapes stop working.

Tape Filenames

Whenever an empty string ("") is used as the tape filename for an input operation, BASIC acts as if no filename was specified and uses the next file on the tape. This is useful with the *OPEN* statement when the name of the file is unknown, and also with *CLOADM* to load a file using an offset without typing the filename.

CSAVEM, CLOADM And Offsets

The index of at least some versions of the CBASIC manual lists a command called *CSAVEM*, which supposedly will "write out a machine language file" and has the syntax:*CSAVEM X,4E,6F,5F.*

But don't believe them. First of all, Color BASICdoesn't have a *CSAVEM;* it's an Extended BASIC command. The Extended BASIC manual says the same thing, but the command as given still doesn't work because all four of the arguments given are incorrect. For a while it was assumed that Extended BASIC didn't have a *CSAVEM* either, but eventually the correct syntax was discovered, either through experimentation or disassembly of the ROM:

CSAVEM "filename", start address, end address, exec address

The Disk BASIC manual carries on the great tradition by giving an incorrect example for the *SAVEM* command. At least now they use a string for the filename. The arguments for *CSAVEM* are not hexadecimal numbers; they are standard numerical expressions. Of course, if you only know the addresses in Hex, you can use the &H prefix, which evaluates to such an expression. To load one of these files at a different address than it was made at, an offset is used, and the file is loaded at its original address plus the offset. To load a file at an address greater than the address it was made at:

(C)LOADM "filename", new address old address

To load a file at an address lower than the original, a wrap-around effect is used:

(C)LOADM "filename",new address-old address+65536

and $10000 is subtracted from the address; i.e., an offset of $F000 causes the file to be loaded $1000 below its original address.

EXEC

When a file is *CLOADMed* or *LOADMed*, the exec address from the file plus the offset is stored in the exec pointer at $9D. When *EXEC* is used without an argument, the routine addressed by the pointer is called as a subroutine. If *EXEC* is used with an argument, the argument is stored in the exec pointer for use by the next *EXEC.* When making a machine language file which is not to be executed, such as a block of data or a saved picture, an exec address of $B44A may be used, since this is the address that the pointer is set to when BASIC is started and is the address of BASIC's FC Error routine.

ASCII Files And The Cassette Merge

The *SAVE* and *CSAVE* commands support two formats for the output file. The tokenized or compressed form is the most common. It consists of an exact dump of BASIC's program area, and since command words and functions are replaced by one or two byte tokens, it usually produces shorter files. The ASCII or listed format is invoked by commands of the form: *(C)SAVE "filename",A.*

Since ASCII files are made by simply opening the output file and listing the program into it, they can be accessed from BASIC as data files or read directly into any text editor that doesn't use its own file format. The *LOAD* and *CLOAD* routines test the input file for which type it is and act accordingly. Tokenized files are read back into the program area, the proper pointers are set, and the program's line pointers are fixed according to its new position in memory. The ASCII file loader does a *NEW*, opens the file for input, and jumps to the same "idle loop" that normally inputs lines from the keyboard. Often it is helpful to be able to combine lines from two programs. Disk BASIC provides this utility with the *MERGE* command, which operates similarly to *LOAD* except it only accepts ASCII files and doesn't call *NEW* first. Several methods have been suggested for merging two cassette programs together, often by setting the "start of program" pointer to the end of the first program to load the second; however, most of these require several *POKEs* and *PEEKs* or a machine language routine, and part of the procedure has been omitted in some accounts so that if the end of the first program happens to fall on a page boundary, the user is required to *POKE* a -2 into the "start of program" pointer. Besides, this process requires that the line numbers of the first program be lower than those of the second. By emulating the *MERGE*

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command in cassette BASIC, these problems are solved. The process of opening the file, setting the device number to -1, and calling the idle loop can be accomplished in one line: *OPEN "1",-1,"filename":POKE 111,255:EXEC 44156* for the program "filename", or *OPEN "1", -1,"":POKE 111,255:EXEC 44156* for the next file on the tape. Remember that this only works with an ASCII file. If any line numbers exist in both programs, the lines in the file will replace those in RAM.

SKIPF

According to the Color BASIC manual, *SKIPF* is used to position the tape to the end of the last program. I have found it just as useful as a method of verifying that a file has been written without errors. Since the tape read routines used by *SKIPF* test the checksums of each data block, attempting to *SKIPF* a bad file will cause an I/O Error. In the case of a BASIC or machine language program, the user can then rewrite the file. *SKIPF* is more versatile than the Level II equivalent *"CLOAD?"*, which only works with BASIC files of which an identical copy is still in RAM.

READ and INPUT

Data to be read or inputted may not be a variable or arithmetic expression, but it may be a Hex or Octal constant in Extended BASIC. Strings to be read or input may be enclosed in quotation marks, which allow leading and trailing blanks, commas, and colons to be included in the string:

```
10 READ A,A$:DATA &H3FF,"
COMMA, COLON: "
```

There are several standard methods of speeding up Microsoft BASIC programs. First of all, *GOTOs* and *GOSUBs* work faster if the line referenced is either near the beginning of the program or immediately after the line with the *GOTO* or *GOSUB*. Hex and Octal constants are evaluated much faster than decimal ones. Programs will run faster if the most often used variables are created first. Also, every time a simple variable is created, all the arrays are moved to make room for it, so if large arrays are used, all simple variables should be declared before the arrays are dimensioned. Finally, Color BASIC 1.2 and Disk BASIC 1.1 have a new interpret loop that only scans the keyboard before each statement if at least one key is down. With either of these ROMs or the equivalent in RAM, execution is speeded up by varying amounts depending on program content.

DIM

Besides dimensioning arrays, *DIM* may be used to create a list of simple variables. A program that declares all of its variables and then dimensions its arrays with a statement like *DIM A,B,C,I,X,Y,A$,B$,A(1000),B$(50)* will run faster than one that doesn't.

Relational and Logical Operators and IF/THEN

The Color BASIC manual gives a list of BASIC operators on Page 306 but doesn't define most of them. The relational operators ("=", ">", "<", ">=", etc.) with numeric operands give a value of -1 if the expression is true, or 0 if it is false. For example, *PRINT B>=C* gives -1 if B is greater than or equal to C, or 0 if B is less than C. Relational operators used with string operands compare them alphabetically. AND and OR convert each expression to a 16-bit integer and do the correct logical operation to get the result. For example, a binary 0111 *ANDed* with 1110 equals binary 0110:

```
PRINT 7 AND 14
```

gives 6= 0110 binary. The *NOT* operator has one operand and simply complements each bit. This has the effect of turning a -1 into a 0 or a 0 into a -1. According to the Color BASIC manual, IF/THEN "tests the relationship" and acts accordingly. Actually, IF simply evaluates a numerical expression and takes 0 as false and anything else as true. Therefore, *X= A=1 AND B>6: IF X THEN PRINT B* is the same as *IF A=1 AND B>6 THEN PRINT B* and *IF Y THEN 300* may be substituted for *IF Y<>0 THEN 300.*

NEXT

Like most Microsoft BASICs, Color BASIC allows *NEXT* without a variable to close the last loop entered. Also, statements of the form *NEXT X,Y,Z* may be used to close multiple loops.

INKEY$

INKEY$ does not simply return the key being pressed at the instant it is executed. Before each BASIC statement is executed, the keyboard is tested and if a new key is pressed (other than *SHIFT* @ or BREAK) its value is stored at $87. *INKEY$* tests this address, and if a key has been pressed, it returns a string with that character and stores a 0 in $87. Otherwise, *INKEY$* scans the keyboard again and if a new key is pressed, it uses it for the string. This sometimes causes *INKEY$* to eat a BREAK character and return a *CHR$(3)*. If you want to have a program stop and wait for the user to press a key, it is best to use a routine like:

```
60000 IN$=INKEY$
60010 IN$=INKEY$: IF IN$=""
THEN 60010
60020 IF IN$=CHR$(3)THEN STOP
60030 RETURN
```

Where the first *INKEY$* clears out any key that may have been previously pressed, and Line 60020 tests for the BREAK key.

Joystick Buttons

According to the manual, *PEEK (65280)* returns 255 or 127 if neither joystick button is pressed, 126 or 254 if the right button is pressed, or 125 or 253 if the left button is pressed. Obviously this cannot be correct when both buttons are pressed at once. To separate the button bits from each other as well as from the keyboard scan inputs which appear in the same byte, it is much better to use the *AND* operator with lines like:

```
10 IF (PEEK(65280) AND 1)=0
THEN ? "RIGHT BUTTON"
20 IF (PEEK(65280) AND 2)=0
THEN ? "LEFT BUTTON"
30 GOTO 10
```

RND

According to the Color BASIC manual, *RND* returns a random integer between one and its argument, which is supposed to be greater than one. This works fine; however, it is not the only way to use *RND*. For arguments in the range between zero and one, *RND* returns one. But *RND(0)* returns a number in the range of *0<=X<1*. This is the way "standard" BASIC defines *RND(0)*. For arguments less than zero, *RND* returns a value which is not random but actually is dependent only on the argument. More importantly, using *RND* with a negative argument sets Color BASIC's random seed value at $116-$119 according to the argument. A statement like *X=RND(-TIMER)* in Extended BASIC randomizes the random number generator much as the Level II RANDOM statement does. Note that Radio Shack's newsletter once recommended *A=RND(TIMER)* to do this, but this positive argument does not randomize anything. This feature can also be used to "unrandomize" the seed: *X=RND(-6)* 'or any negative constant executed at the beginning of a program or routine using *RND* will cause the same "random" number sequence each time the program or routine is run.

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VIP™ Library

VIP Calc™

By Kevin Herrboldt

You can forget the other toy calcs — The real thing is here! No other spreadsheet for the Color Computer gives you:

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Radio Shack Catalog No. 90-0143

32K (Comes with tape & disk) $69.95

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- Fully CoCo 2 Compatible
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- Four Different Display Colors
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VIP Terminal™

RATED BEST IN JANUARY 1984 "RAINBOW"

By Dan Nelson

From your home or office you can join the communication revolution. The **VIP Terminal™** opens the world to you. You can monitor your investments with the Dow Jones Information Service, or broaden your horizons with The Source of CompuServe, bulletin boards, other computers, even the mainframe at work.

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FEATURES: Choice of 8 hi-res lowercase diplays * Memory-Sense with BANK SWITCHING for full use of workspace * Selectively print data at baud rates from 110 to 9600 * Full 128 character ASCII keyboard * Automatic graphic mode * Word mode (word wrap) for unbroken words * Send and receive **Library** files, Machine Language & BASIC programs * Set communications baud rate from 110 to 9600, Duplex: Half/Full/Echo, Word length: 7 or 8, Parity: Odd/Even or None, Stop Bits: 1-9 * Local linefeeds to screen * Save and load ASCII files, Machine Code & BASIC programs * Lowercase masking * 10 Keystroke Multiplier (MACRO) buffers to perform repetitive pre-entry log-on tasks and send short messages * Programmable prompt or delay for send next line * Selectable character trapping * Send up to ten short messages (KSMs), each up to 255 characters long, automatically, to save money when calling long distance.

All versions allow tape load and save of files and KSMs, but the disk version also has the Mini Disk Operating System.

Radio Shack Catalog No. 90-0139

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(Tape comes in 16K but without hi-res displays)

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By Tim Nelson

This high speed MACHINE LANGUAGE program fills all your information management needs, be they for your business or home. And it does so better than any other database program for the Color Computer, featuring machine code, lowercase screens and mailmerge capabilities. Inventory, accounts, mailing lists, family histories, you name it, the **VIP Database™** will keep track of all your data, and it will merge **VIP Writer™** files.

The **VIP Database™** features the **Library** Memory Sense with BANK SWITCHING and selectable lowercase displays for maximum utility. It will handle as many records as fit on your disk or disks. It is structured in a simple and easy to understand menu system with full prompting for easy operation. Your data is stored in records of your own design. All files are fully indexed for speed and efficiency. Full sort of records is provided for easy listing of names, figures, addresses, etc., in ascending or descending alphabetic or numeric order. Records can be searched for specific entries, using multiple search criteria. With database form merge you may also combine files, sort and print mailing lists, print "boiler plate" documents, address envelopes - the list is endless. The math package even performs arithmetic operations and updates other fields. Create files compatible with the **VIP Writer™** and **VIP Terminal™**. Unlimited print format and report generation with the ability to imbed control codes for use with all printers.

As with all other **Library** programs, the **Database** features the powerful Mini Disk Operating System.

Radio Shack Catalog No. 90-0140

32K DISK $59.95

64K Required for math package & mail merge

VIP Disk-ZAP™

RAVED ABOUT IN THE APRIL 1983 "RAINBOW!"

By Tim Nelson

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SCHOOL IS IN THE HEART OF A CHILD

16K

Play Together, Learn Together

> *Alas, home is where homework must be done. Even the name of the activity undermines the process of learning. It is called* work *and not* discovery *or* learning *or* fun. *Therefore, the extension of school into home becomes negative reinforcement. Homework is something undesired but endured by the kid, enforced by the parent because someone says it must be done. Frequently, homework is used as punishment.*
>
> ***— Laran Stardrake***

By Bob Albrecht and Ramon Zamora
Rainbow Contributing Editors

"School Is In The Heart of a Child" is for parents of quite young children. We want to help you work and play with your three- to eight-year-old child and learn to use computers as a joyful family experience. We want to suggest ways to incorporate the home computer as another means to encourage your child's independence, growth, and control over his own life. See the pride on her face as she directs the computer to do what she with deliberation selects. See her head gears switch to "on" as she progresses step-by-step with your presence and caring direction.

We will explore (we hope, with *your* help) the following:

- Specific "teaching" techniques so that the discovery can be the child's own.
- Critical evaluation of software based on extensive playtesting in family and related environments.
- Additional resources to consult: books, magazines, software publishers, networks, etc.
- Suggestions for interludes and fun times away from the computer (a must): call the librarian for specific information; watch a TV program together and discuss it; work together as volunteers in a community project; take a spring (or fall or winter or summer) awareness walk . . .
- Whatever we learn from families we work with in Menlo Park or from you, our readers. Let's pool our knowledge. Let's share our experiences as we all learn from our children.

We also provide small programs you can type in and use right now.

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(Well-known author Bob Albrecht also writes the "Game Master's Apprentice" feature for The Rainbow each month. Ramon Zamora is author and co-author of several books, co-founder of ComputerTown USA!, *and currently designing computer games for kids at Child Ware Corp. in Menlo Park, Calif.)*

We were pleasantly surprised to find a new version of the game *Reverse*, by Donald Clerc, in the July 1984 issue of THE RAINBOW. *Reverse*, invented by Peter Lynn Sessions, was first published in *People's Computer Company*, volume 1, number 5, May 1973. *PCC* was the first periodical devoted entirely to personal access to computers. People's Computer Center, where *Reverse* was invented, was the first storefront, open-to-the-public computer center, way back in 1972.

To play *Reverse*, you begin with a scrambled list of numbers and try to put them in order with the smallest number on the left and the largest on the right. For example, start with this list:

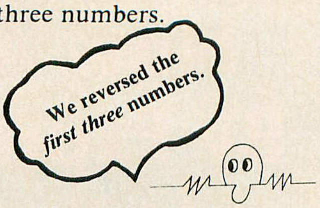
2 5 1 4 3

We want to put the list in the following order.

1 2 3 4 5

Each turn, you can reverse the first two numbers, or the first three numbers, or the first four numbers, or all five numbers. Let's reverse the first three numbers.

Original List: 2 5 1 4 3
Reverse 3: 1 5 2 4 3


We reversed the first three numbers.

Well, that put one in the first position but, alas, the rest of the list is still scrambled. What to do? Just for fun, let's reverse all five numbers.

3 4 2 5 1

Hmmmm . . . that didn't help much. Oh well, let's reverse two.

4 3 2 5 1

That's better! Carry on, please. Can you complete the task with three more reversals? Remember, you can reverse numbers only from the left end. You can reverse two numbers, or three numbers, or four numbers, or five numbers. Okay, you can also reverse one number, but that doesn't change anything!

Now try some of these. In each case, we tell you how many reversals you can do it in.

1) 5 4 3 2 1	One reversal.
2) 4 5 3 2 1	Two reversals.
3) 2 1 4 5 3	Three reversals.
4) 3 2 5 4 1	We did this one in six reversals, then we tried another way and did it in only four reversals.

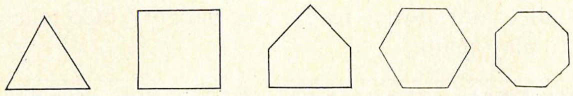
Yes, *Reverse* is a great game! We encourage you to play paper-and-pencil *Reverse* with your kids. It's OK to start with real easy lists such as 321 or 231 or (surprise!) 123.

"Mariko, suppose we start with **1 2 3**. How many should we reverse?"

Mariko looks askance and huffs, "Robert, those numbers are already in their proper place!"

The *Reverse* universe is expanding. Thanks, Donald Clerc, for showing us a new variation in the July issue of THE RAINBOW. We suggest more variations.

1) The original game: Numbers 1 to N (N = 9).
2) Other numbers: N numbers from a given set of numbers. For example, up to nine numbers in the range 1 to 20.
3) Alphabet *Reverse*: Put letters in order.
4) Shape *Reverse:* Put shapes in order. For example, scramble these shapes:



5) Color tones. Associate a tone with something visual and put the tones (scale of C?) in ascending order.

Then think about double *Reverse*. Start with rows and columns of numbers.

```
7 2 4
5 9 1
8 3 6
```

Put the numbers in order, as follows.

```
1 2 3
4 5 6
7 8 9
```

You can reverse two or three numbers from the left in any row or from the top in any column. More about this next time.

If all the above and a little bit more came on one cassette or one disk for a 16K CoCo, we would sure be inclined to like it!

Thanks, Peter Lynn Sessions, wherever you are, for inventing a great game.

Guess My Word

We have several simple word games in mind to give to you. We'll begin with a game to guess a three-letter word. Here are the words.

```
30000 REM**WORD LIST
30100 DATA ADD,AGE,AIR,ALL,AND
30110 DATA ANT,ANY,ARE,ARM,ASK
30200 DATA BAD,BAG,BAT,BED,BEE
30210 DATA BIG,BOW,BOX,BOY,BUS
30220 DATA BUT,BUY
30300 DATA CAN,CAP,CAR,CAT,COW
30310 DATA CRY,CUP,CUT
30400 DATA DAY,DIE,DIG,DOG,DOT
30410 DATA DRY,DUG
30500 DATA EAR,EAT,EGG,END,EYE
30600 DATA FAN,FAR,FAT,FEW,FIT
30610 DATA FIX,FLY,FOX,FUN,FUR
30700 DATA GAS,GEE,GET,GNU,GOT
30800 DATA HAT,HAY,HEN,HER,HIM
30810 DATA HIP,HIS,HIT,HOP,HOT
30820 DATA HOW,HUG
30900 DATA ICE,IMP,INK,ITS
31000 DATA JAM,JAR,JET,JOB,JOG
31100 DATA KEY,KID
31200 DATA LAY,LEG,LET,LID,LIE
31210 DATA LOT,LOW,LUG
31300 DATA MAD,MAN,MAP,MAY,MIX
31310 DATA MOP,MUG
31400 DATA NAP,NET,NEW,NOD,NOT
31410 DATA NOW,NUT
31500 DATA ODD,OFF,OLD,ONE,OUR
31510 DATA OUT,OWN
31600 DATA PAL,PAN,PAT,PAY,PEA
31610 DATA PEN,PET,PIE,PIG,PIN
31620 DATA POT,PUT
31800 DATA RAN,RAT,RAW,RED,RUB
31810 DATA RUG,RUN
31900 DATA SAD,SAT,SAW,SAY,SEA
31910 DATA SEE,SET,SEW,SHE,SIP
31920 DATA SIT,SIX,SKY,SON,SUN
32000 DATA TAG,TAN,TAP,TAX,TEA
32010 DATA TEN,THE,TIE,TOE,TOO
32020 DATA TOP,TOY,TRY,TUG,TWO
32100 DATA UFO,USE
32200 DATA VAN,VOW
32300 DATA WAG,WAS,WAY,WEB,WET
32310 DATA WHO,WHY,WIN,WON
32500 DATA YAK,YAP,YES,YOU
32600 DATA ZAP,ZEN,ZOO
32700 DATA ***
```

Look at the list. You will see that the A's begin at Line 30100, the B's at Line 30200, the C's at Line 30300, and so on. The Z's begin at Line 32600 and Line 32700 contains an end-of-data flag, ***. There is plenty of room for you to add additional words, perhaps from a book you and your child like to read together.

We encourage you to put this word list on a tape cassette or disk. We will use it again in future games. We'll describe the rest of the game a block at a time. First, we want to reserve memory space for strings and for a string array to hold up to 200 words. Our list has 179 words, including ***. If you add a lot of new words, you may have to change Line 110.

```
100 REM**GUESS MY WORD SCH 8-1
110 CLEAR 2000: DIM WORD$(200)
120 CLS
130 PRINT "GUESS MY WORD GAME"
140 PRINT
150 PRINT "I'M MEMORIZING WORDS.
"
```

Next, we want the CoCo to read the words from the *DATA* statements, store them in the array *WORD$*, and count the words as they are stored.

```
200 REM**READ & COUNT WORDS
210 NW = 0
220 NW = NW + 1
230 READ WORD$(NW)
240 IF WORD$(NW)<>"***" THEN 220
250 NW = NW - 1
```

Look at the word list. The first word (ADD) is stored in *WORD$(1)*, the second word (AGE) is stored in *WORD$(2)*, and so on. ZOO is put into *WORD$(178)* and *** goes into *WORD$(179)*. Since *** is not really a word, Line 250 subtracts one from NW to make it 178, the number of actual words in the *DATA* statements.

The CoCo is ready to play, so let's tell people how to play.

```
300 REM**TELL HOW TO PLAY
310 CLS
320 PRINT "I'LL THINK OF A 3-LET
TER WORD."
330 PRINT "MY WORD IS BETWEEN AA
A AND ZZZ."
340 PRINT
350 PRINT "MY LOWEST 'WORD' IS A
AA."
360 PRINT "MY HIGHEST 'WORD' IS
ZZZ."
370 PRINT:PRINT "PRESS ANY KEY A
ND WE'LL PLAY";
380 XX = RND(NW): IF INKEY$=""
THEN 380
390 PRINT
```

Think of a mountain with AAA at the bottom and ZZZ at the top. If the CoCo's secret word is FUN and you guess CAT, it will tell you to try a higher word. If you guess SKY, it will tell you to try a lower word.

What about Lines 370 and 380? They "spin" the random number wheel until you press a key. Thus, you will probably start with a different word each time you enter and run the program.

The CoCo now picks a secret word at random from the list stored in *WORD$*. Then it asks for your guess.

```
400 REM**PICK A RANDOM WORD
410 RW = RND(NW): W$ = WORD$(RW)
499 '
500 REM**GET GUESS
510 PRINT: INPUT "YOUR GUESS";G$
```

The CoCo's secret word is called W$ and your guess is called G$. If you didn't guess the word, block 600 gives you a hint and goes back for another guess.

```
600 REM**IF INCORRECT, GIVE CLUE
610 IF G$<W$ THEN PRINT "TRY A H
IGHER WORD": GOTO 510
620 IF G$>W$ THEN PRINT "TRY A L
OWER WORD": GOTO 510
```

If you guess the word, the CoCo goes on to block 700 and gives you your reward.

```
700 REM**WINNER!
710 CLS
720 PRINT "THAT'S IT! YOU GUESSE
D MY WORD."
730 FOR K=1 TO 50
740 : SP = RND(507)
750 : TN = RND(255)
760 : PRINT @SP, W$;
770 : SOUND TN, 1
780 NEXT K
```

Finally, your always-ready, ever-patient CoCo tells you how to play again.

```
800 REM**TELL HOW TO PLAY AGAIN
810 PRINT @448, CHR$(30)
820 PRINT @480, "TO PLAY AGAIN,
PRESS SPACE" CHR$(30);
830 K$=INKEY$:IF K$="" THEN 830
840 IF K$=" " THEN 310 ELSE 830
```

Enter the program, including our word list or one of your choosing, and play. Here is a game we played.

```
I'LL THINK OF A 3-LETTER
WORD. MY WORD IS BETWEEN
AAA AND ZZZ.


MY LOWEST 'WORD' IS AAA.
MY HIGHEST 'WORD' IS ZZZ.

YOUR GUESS? ■
```

What word shall we guess? Let's try CAT. We typed CAT and pressed the ENTER key.

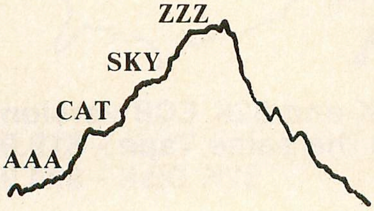
```
YOUR GUESS? CAT
TRY A HIGHER WORD

YOUR GUESS? ■
```

Higher word? Oh, "higher in the alphabet" or "up the mountain towards ZZZ." So next we tried SKY.

```
YOUR GUESS? SKY
TRY A LOWER WORD

YOUR GUESS? ■
```



Hmmmm. What would happen if . . . well, let's try it. We typed just the letter M.

```
YOUR GUESS? M
TRY A HIGHER WORD

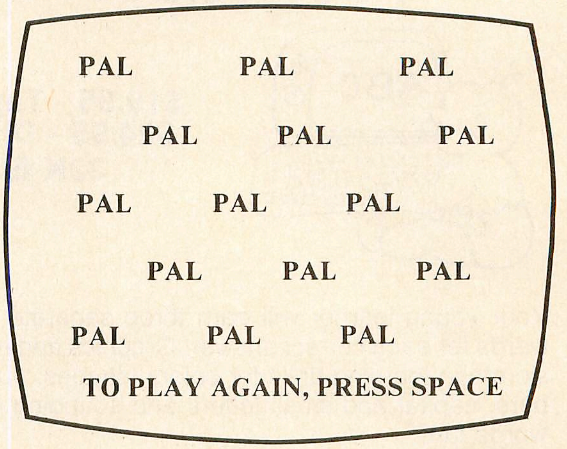
YOUR GUESS? ■
```

Okay! We now know the CoCo's word is higher than M and lower than SKY. How about PET?

```
YOUR GUESS? PET
TRY A LOWER WORD

YOUR GUESS? ■
```

In three more guesses, we guessed the CoCo's secret word, which was PAL. Wow! The CoCo put PAL all over the screen and made all kinds of crazy sounds (see block 700). Then it told us how to play again.



```
PAL         PAL         PAL
       PAL        PAL         PAL
PAL        PAL        PAL
       PAL        PAL         PAL
PAL        PAL        PAL
 TO PLAY AGAIN, PRESS SPACE
```

We hope you and a child try this game. It's okay to let the

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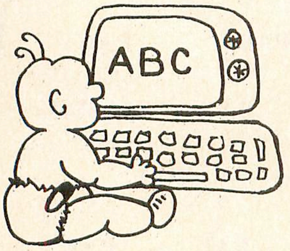

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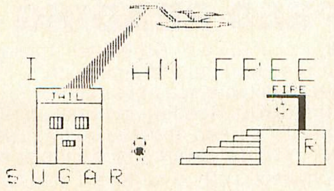

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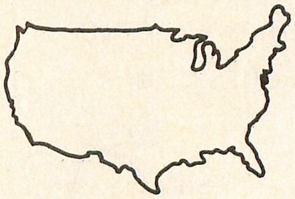

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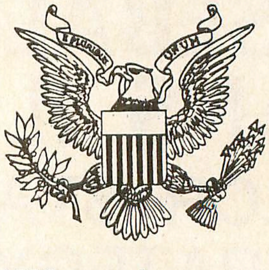

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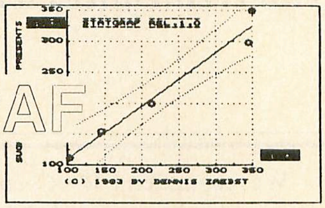

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young player look at the word list before playing or even while playing. Keep a children's dictionary handy in case the CoCo's word is new to the child. Play together, learn together! Invent some strategies for guessing the CoCo's word in the fewest guesses. Next time, we will suggest some strategies.

PlayTest Impressions

Sheri Bakun reports on *Mr. Cocohead* from Computer Island.

Using *Mr. Cocohead,* the pre-schooler can create a great variety of faces on the computer screen. Even very young children (ages three and four) can create faces with this game. To draw a face, the child chooses from a selection of head shapes, noses, eyes, mouths, ears, hair, and even glasses. The selection of each facial feature involves merely pressing the key designated for that attribute. For example, each time the letter 'E' is pressed a new pair of eyes appears. Other keys cause the face to wink one eye and to "speak" by printing a message using the child's name.

A feature of *Mr.Cocohead* that was greatly enjoyed by our playtesters is the ability to add to a picture by placing any number of large colored S shapes anywhere on the screen. Five-year-old Rob delighted in using the S's to add gigantic ears to one face he designed, and a neck and shoulders to another. When the S's are moved over areas of the screen that have drawing on them this drawing is erased, thus giving the young artist even more control in creating the picture. However, this ability to erase makes this feature difficult for younger children.

> *"Using* Mr. Cocohead, *the pre-schooler can create a great variety of faces on the computer screen. Even very young children (ages three and four) can create faces with this game."*

We recommend *Mr. Cocohead* for the pre-school child. It teaches keyboard familiarity, is easy to use, and most of all it's fun to play.

(*Mr. Cocohead* from Computer Island, 227 Hampton Green, Staten Island, NY 10312. 16K Extended Color BASIC cassette for $16.95. Backup copy on reverse side of cassette. Loading time 1 minute 15 seconds.)

Help!

If your home has a kid, three to eight years old, and a CoCo, please share your experiences in using your CoCo with your child. If you write to us, please tell us if it is okay to print all or part of your letter in this column. ComputerKid, P.O. Box 310, Menlo Park, CA 94026.

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Lil' Ole Interest Monitor

By Francis S. Kalinowski

Have you noticed the many lil' ole persons in teller lines at banks, savings and loan associations, and credit unions? They smile while visualizing little goldpiles stashed away in various accounts. They are the prudent ones who moved their savings to insured money market certificates and other higher interest bearing accounts. They smile in anticipation, awaiting each monthly statement to see how their goldpiles have grown.

If you are smiling for the same reason, key in and run *Lil' Ole Person's Goldpile.* This program will broaden your grin with a detailed printout and/or display of how your stashed accounts are growing.

(Francis Kalinowski is retired after 28 years in the U.S. Air Force service in aircraft and radar maintenance, followed by 20 years of technical writing on commercial digital electronics equipment and systems. He spends most of his free time developing printer color art programs on three different computers.)

Lil' Ole Person's Goldpile runs in a 16K CoCo with Extended Color BASIC. It uses 4821 memory bytes with REMs and 3344 bytes without them. All REMs may be removed without affecting program operation.

The program accepts user inputs for up to 11 money accounts and their interest rates. If a printout is requested, the program calculates and prints accounts and earnings information for each day of a selected compounding period. Incrementing day, daily and total interest, and grand total counters appear on the monitor during printout and display only runs.

The program is arranged to minimize RAM space requirements and search time. User input and one-time functions are placed in the last two-thirds of the program. The main operating loop, located in the program's first one-third, is preceded only by frequently *GOSUBed* routines. *FOR/TO* loops initially build and subsequently update all account variable arrays.

Figure 1. Normal character printout (up to 5 accounts)

```
               LIL' OLE PERSON'S  GOLDPILE
                PRINTED FOR COCO 04/15/83.
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
 NO.   ACCNT 1  ACCNT 2  ACCNT 3  ACCNT 4  TODAY'S  ACCUMLTD  GRAND
DAYS   .055 %   .063 %   .075 %   .098 %   INTEREST INTEREST  TOTAL
===================================================================
START 1000.00  2000.00  3000.00  4000.00  0.0000       0.00  10000.00
   1  1000.15  2000.35  3000.62  4001.07  2.1863       2.19  10002.19
   2  1000.30  2000.69  3001.23  4002.15  2.1868       4.37  10004.37
   3  1000.45  2001.04  3001.85  4003.22  2.1873       6.56  10006.56
   4  1000.60  2001.38  3002.47  4004.30  2.1878       8.75  10008.75
   5  1000.75  2001.73  3003.08  4005.37  2.1883      10.94  10010.94
===================================================================
          THIS WAY LIL' OLE COCO CAN EARN    $10.94
          AND END UP WITH $10010.94 IN JUST 5 DAYS.
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
```

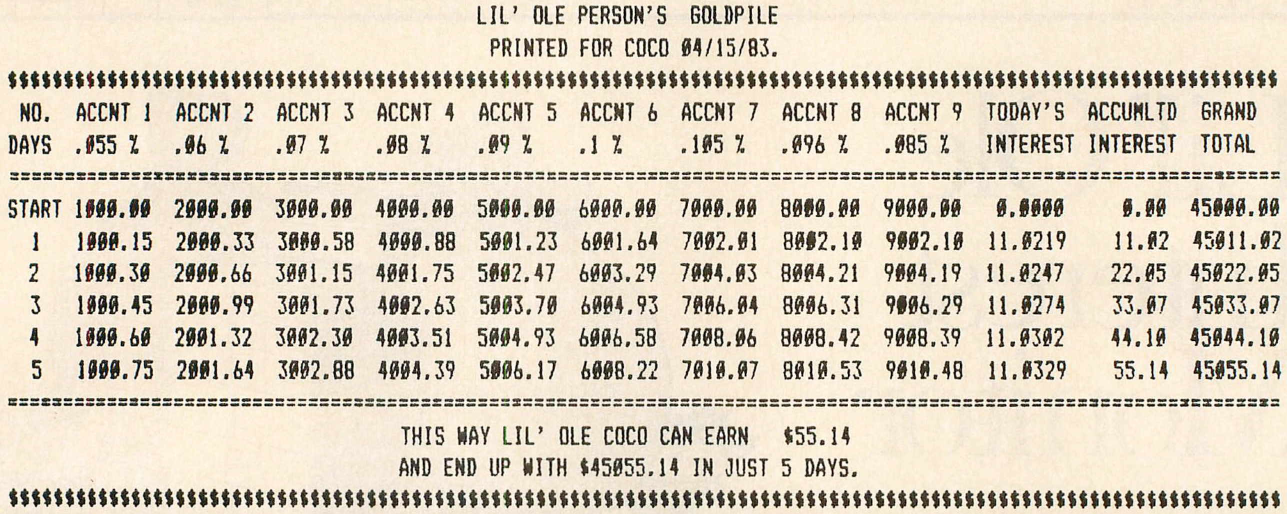

Figure 2. Compressed character printout (6-11 accounts)

```
                                   LIL' OLE PERSON'S  GOLDPILE
                                   PRINTED FOR COCO 04/15/83.
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
 NO.  ACCNT 1  ACCNT 2  ACCNT 3  ACCNT 4  ACCNT 5  ACCNT 6  ACCNT 7  ACCNT 8  ACCNT 9  TODAY'S  ACCUMLTD  GRAND
DAYS  .055 %   .06 %    .07 %    .08 %    .09 %    .1 %     .105 %   .096 %   .085 %   INTEREST INTEREST  TOTAL
==============================================================================================================================
START 1000.00  2000.00  3000.00  4000.00  5000.00  6000.00  7000.00  8000.00  9000.00   0.0000       0.00  45000.00
  1   1000.15  2000.33  3000.58  4000.88  5001.23  6001.64  7002.01  8002.10  9002.10  11.0219      11.02  45011.02
  2   1000.30  2000.66  3001.15  4001.75  5002.47  6003.29  7004.03  8004.21  9004.19  11.0247      22.05  45022.05
  3   1000.45  2000.99  3001.73  4002.63  5003.70  6004.93  7006.04  8006.31  9006.29  11.0274      33.07  45033.07
  4   1000.60  2001.32  3002.30  4003.51  5004.93  6006.58  7008.06  8008.42  9008.39  11.0302      44.10  45044.10
  5   1000.75  2001.64  3002.88  4004.39  5006.17  6008.22  7010.07  8010.53  9010.48  11.0329      55.14  45055.14
==============================================================================================================================
                                 THIS WAY LIL' OLE COCO CAN EARN   $55.14
                                 AND END UP WITH $45055.14 IN JUST 5 DAYS.
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
```

REMs describe functions performed by the various statements and statement groups. Table 1 lists the program's variables.

Statement 640 provides automatic character width switching for printers with normal and compressed character capabilities. This statement's MX-80 compressed character ON/OFF codes CHR$(15) and CHR$(18) must be changed to your printer's compressed/normal character codes. For example, use CHR$(29) and CHR$(30) when running a Microline 80 or 82A printer.

Delete statement 640 if your printer is limited to 80 or fewer characters. Also delete the 11 MAX FOR 132 COLUMNS half of statement 480. When applicable, change statement 480's first half to 3 MAX for a 64-column printer or 1 MAX for a 40-column printer.

PRINT#-2,USING commands provide columnar printouts of account amounts with decimal points aligned vertically. *PRINT#-2,USING"#####.##";GT* in statement 150 ensures to-the-penny printouts of grand totals up to $99999.99.

Program Operation

The program starts with a graphic title that includes printer power and start-when-ready prompts. Pressing the spacebar clears the screen and begins a series of prompts for:

Starting date (if printout selected)
Account owner's name
Number of accounts
Number of compounding days
Account amounts (up to 11)
Account interest rates (up to 11)

Entering the last interest rate changes the screen to the program's operating display. The new display has day, daily interest, total interest, and grand total counters plus a graphic goldpile within a vault outline.

At this point, statement 640 checks the number of accounts entered (variable Y) and sets the printer's character width, as needed. The program also computes a title centering print tab value (PT, statement 650) before starting an accounts printout.

Printouts include a starting message, column headings, starting amounts (first line), and updated amounts for each day of the selected compounding period. Printouts are in normal character width (Fig. 1) for up to five accounts and compressed character width (Fig. 2) for six to 11 accounts. Statement 640 may be deleted for normal character width printouts of up to 11 accounts on 132-column printers using 15-inch paper.

The program loops through statements 80-180 for daily recalculation and printout of all account amounts. The daily calculations also update the displayed day, interest, and grand total counters.

Statement 100 in the loop monitors total interest accumulation. Upon detecting an increase above a predetermined ratio (variable I, statement 760), statement 100 diverts control through grow-pile routine 40-70. This routine adds two gold bricks to the displayed goldpile. In extended runs, the

Table 1. Program Variables

	STRING VARIABLES
A$	Account owner's name
B$	Starting date
S$	Option select
Z$	"VAULT" color POKE code
	NUMERIC VARIABLES
AA(x)	Account amounts (11)
AN(x)	Account numbers (11)
C	STRING$ character code
D	Incremented day
DD	Days in compounding period
DI	Daily interest total
DR(x)	Daily interest rates (11)
FL	First line flag
GT	Grand total
IE(x)	Daily interest amounts (11)
IR(x)	Annual interest rates (11)
P	Title PRINT@ positions
PT	Message printout tab value
T	Item printout tab value
TI	Total interest earned
X	FOR/TO loop integer
BEILQ	Grow-pile routine
RUVWZ	Parameters

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Dolan	188	157	103	112	161	122	99	145	145	103					188	97
Feagan	105	94	127	115	157	97	61	132	113						174	61
Graham	135	135	183	116	151	104	86	149							183	63
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Phelps	167															
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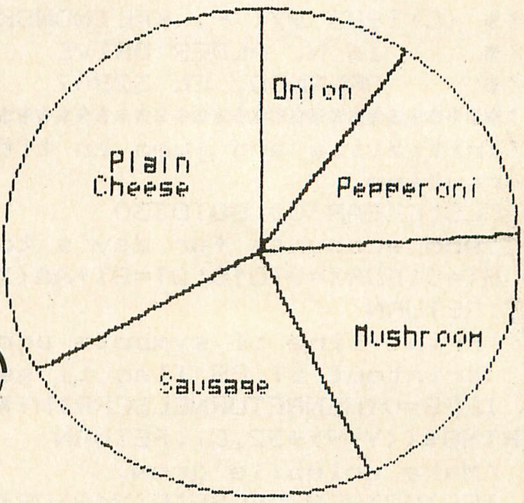

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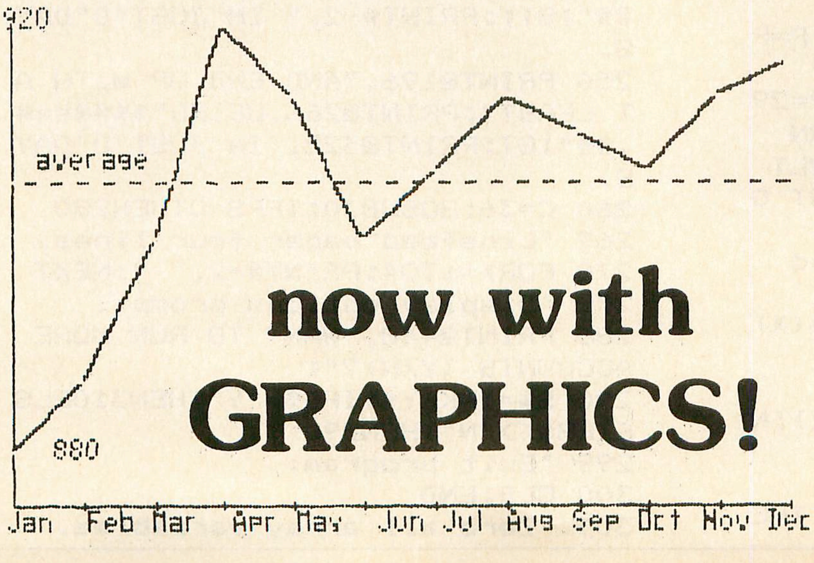

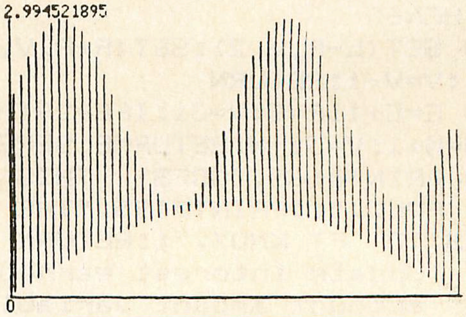

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grow-pile routine fills the vault then prints, "THE REST GOES TO FT KNOX."

Accounts printout and displayed counter updates continue to the last day of the selected compounding period. An ending message with earned and total amounts follows the last day's accounts printout line. A similar message appears on the monitor.

A display-only run operates similarly, except without the printout calculations and functions. Do a display-only run when you don't have a printer or just can't wait for a printout. The display run is ideal for previews of single or multiple account growth over short or long periods. Seeing even small amounts grow may convince you to stick your extra pennies into an interest bearing account instead of a sock or a cookie jar.

80	195
180	28
300	80
440	178
570	20
679	160
END	204

The listing:

```
0 '$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
0 '$ LIL OLE PERSON'S GOLDPILE $
0 '$    FOR 16K COCO WITH ECB   $
0 '$ (C)1983 BY: F. KALINOWSKI $
0 '$       16 N. ALDER DRIVE     $
0 '$       ORLANDO, FL 32807     $
0 '$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
9 'Initialize and jump to title
   routine.
10 CLS:CLEAR300:GOTO330
19 'Add accounts for day's total
20 GT=0:FORX=0TO10:GT=GT+AA(X):N
EXT:RETURN
29 'Print line of symbols across
    printout if PS flag is set.
30 IFPS=0THENRETURNELSEPRINT#-2,
STRING$((Y*9)+32,C):RETURN
39 'Make goldpile grow.
40 IFE>52THEN70ELSEIF(V<8)OR(P<0
)THEN60
50 SET(L-P,V,2):SET(R+P,V,2):P=P
-1:V=V-1:RETURN
60 E=E+1:P=E:V=31:IFE>29THENP=29
:W=W+1:V=31-W:RETURNELSERETURN
70 PRINT@163,"OOPS!  THIS VAULT
IS FULL.";:PRINT@195,"THE REST G
OES TO  FT KNOX.";:RETURN
79 'Update interest earned and
    account amount variables.
80 FORX=0TOY-1:IE(X)=DR(X)*AA(X)
:AA(X)=AA(X)+IE(X):NEXT
89 'Update day's interest.
90 DI=0:FORX=0TO10:DI=DI+IE(X):N
EXT
99 'Update total interest.
100 TI=TI+DI:GOSUB20:IF TI>I THE
NGOSUB40:I=I+U
109 'Check printout flag.
110 IFPS=0THEN160
119 'Print START on first line.
120 X=0:IFFL=0THENPRINT#-2,"STAR
T";:FL=1:X=0:ELSEPRINT#-2,USING"
###  ";D;
129 'Update printout's account
     amounts.
130 PRINT#-2,USING"#####.## ";AA
(X);
140 X=X+1:IFX<Y THEN130
149 'Update interest today and
     accumulated and grand total
150 PRINT#-2,USING" ##.#### ";DI
;:PRINT#-2,USING"#####.##  ";TI;
:PRINT#-2,USING"#####.##";GT
159 'Update displayed interest,
     total $, and day counters.
160 PRINT@464,D;:PRINT@394,USING
"$$#####.##";GT;
170 PRINT@64,USING"$$#.###";DI;:
PRINT@79,USING"$$####.##";TI;
179 'Test for last day of the
     accounting period.
180 D=D+1:IFD<DD+1THEN80ELSED=D-
1
189 'Shift printing tab if only
     one account.
190 IFPT<8THENPT=8
200 C=61:GOSUB30:CLS
209 'Display ending message.
210 PRINT@68,"THIS WAY, LIL' OLE
 "A$;:PRINT@135,"CAN EARN";:PRIN
T@144,USING"$$###.##";TI;
219 'Check printout flag.
220 IFPS=0THEN250
229 'Print ending message.
230 PRINT#-2,TAB(PT-8)"THIS WAY
LIL' OLE "A$" CAN EARN ";:PRINT#
-2,USING"$$###.##";TI
240 PRINT#-2,TAB(PT-8)"AND END U
P WITH ";:PRINT#-2,USING"$$####.
##";GT;:PRINT#-2," IN JUST"D"DAY
S.
250 PRINT@196,"AND END UP WITH A
T LEAST":PRINT@266,USING"$$#####
.##";GT:PRINT@328,"IN JUST"D"DAY
S.
260 C=36:GOSUB30:IFPS=0THEN280
269 'Linefeed paper four lines.
270 FORX=1TO4:PRINT#-2," ":NEXT
279 'Display options prompt.
280 PRINT@448,"WANT TO RUN MORE
ACCOUNTS (Y/N)?";
290 S$=INKEY$:IFS$="Y"THEN310ELS
EIFS$<>"N"THEN290
299 'Exit program.
300 CLS:END
309 'Zero all array variables.
```

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```
310 FORX=0TO10:AA(X)=0:AN(X)=0:I
E(X)=0:IR(X)=0:NEXT
320 D=0:TI=0:DI=0:IE=0:FL=0:C=22
:W=0:CLS1:GOTO460
329 'Display title with printout
     and start prompts.
330 P=50:X=27:PRINT@0,STRING$(46
,159)
340 PRINT@P,STRING$(X,159);:P=P+
33:X=X-2:IFX>6THEN340
350 PRINT@P,STRING$(35,159);:PRI
NT@172,"LIL' OLE";
360 PRINT@236,"PERSON'S";:PRINT@
300,"GOLDPILE";
370 PRINT@449,"DO YOU WANT A PRI
NTOUT (Y/N) ?
380 S$=INKEY$:IFS$="N"THEN400ELS
EIFS$<>"Y"THEN380
390 PS=1:PRINT@449,"    TURN PRI
NTER POWER ON.    ";:GOTO410
400 PS=0:PRINT@449,STRING$(30,32
)
410 PRINT@483,"PRESS <SPACEBAR>
TO START.";
420 S$=INKEY$:PRINT@RND(26)+386,
"$";:IFS$<>" "THEN420
429 'Display printout specifica-
     tion prompts.
430 CLS1:PRINT@3,"LIL' OLE PERSO
N'S GOLDPILE":PRINTSTRING$(32,36
)
440 IFPS=0THEN460
450 INPUT"WHAT'S THE START DATE
(MM/DD/YY)";B$
460 INPUT"WHAT IS THE ACCOUNT OW
NERS NAME";A$
470 PRINT"HOW MANY ACCOUNTS FOR
PROCESSING";
480 PRINT" (5 MAX FOR 80-COLUMN
PRINTER;":PRINT" 11 MAX FOR 132-
COLUMN PRINTER)  OR FOR DISPLAY
ONLY.)";
490 INPUT"";Y
500 INPUT"HOW MANY COMPOUNDING D
AYS";DD
509 'Display account amount and
     interest rate promts.
510 CLS1:FORX=1TOY
520 PRINT"ACCNT"X"STARTING AMOUN
T ($)?
530 INPUT"";AA(X-1)
540 PRINT"ACCNT"X"INTEREST RATE
(.00)?
550 INPUT"";IR(X-1)
559 'Set growpile working limits
560 NEXT:CLS0:PRINTSTRING$(96,14
3);:V=31:L=31:R=32:E=22:P=22:RES
TORE
569 'Display interest, grand
     total, and day counters.
570 PRINT@3,"LIL' OLE PERSON'S G
OLDPILE";:PRINT@40,"(WATCH IT GR
OW!)
580 PRINT@66,"0.00  %TODAY    $0
0.00 %TOTAL";
589 'Print 'VAULT'.
590 FORX=1261TO1266:READZ$:POKEX
,VAL(Z$):NEXT
599 'Draw vault outline.
600 FORX=0TO63:SET(X,7,8):NEXT:F
ORX=8TO31:SET(0,X,8):SET(63,X,8)
:SET(1,X,8):SET(62,X,8):NEXT
609 'Draw goldpile.
610 FORX=1TO199:NEXT:C=20:FORX=4
85TO206STEP-31:PRINT@X,CHR$(151)
;STRING$(C,159);CHR$(155);:C=C-2
:NEXT
620 PRINT@175,CHR$(151);CHR$(155
);:PRINT@394,"  $0000.00  ";:PRI
NT@459," DAYS 00  ";
630 IFPS=0THEN750
639 'Switch printer's character
     width mode, as needed.
640 IFY>5THENPRINT#-2,CHR$(15)EL
SEPRINT#-2,CHR$(18):'<MX80 CODES
 (Change CHR$(15) and CHR$(18)
 to your printer's compressed
 character ON/OFF codes.)
649 'Compute tab value to center
     the printout's title.
650 PT=INT((Y*9)+6)/2
659 'Print account listing title
660 PRINT#-2,TAB(PT-1)"LIL' OLE
PERSON'S  GOLDPILE
670 PRINT#-2,TAB(PT)"PRINTED FOR
 "A$" "B$".
679 'Print column headings.
680 C=36:GOSUB30:PRINT#-2," NO."
;:X=1:FORT=6TOY*9STEP9
690 PRINT#-2,TAB(T)"ACCNT"X;:X=X
+1:NEXT
700 PRINT#-2,TAB(T)"TODAY'S";TAB
(T+9)"ACCUMLTD";TAB(T+19)"GRAND
710 PRINT#-2,"DAYS";:X=0:FORT=5T
OY*9STEP9
720 PRINT#-2,TAB(T)IR(X)"%";:X=X
+1:NEXT
730 PRINT#-2,TAB(T+1)"INTEREST I
NTEREST";TAB(T+20)"TOTAL
740 C=61:GOSUB30
749 'Compute daily interest rate
     array variables.
750 FORX=0TOY-1:DR(X)=IR(X)/365:
NEXT:GOSUB20
759 'Compute growpile ratio.
760 U=INT(GT/4400):IFU<1THEN U=1
770 I=U:GOTO110
779 'Z$ data for POKEs in 590.
780 DATA 22,1,21,12,20,58
```

Multiple Choice Test Generator

By Gary Kinney

The multiple choice test generator is not new, but this one allows the easy use of subscripts and superscripts. Science and math require the extensive use of these. The printing program for the LP VII will print subscripts and superscripts of the numerals zero to nine, + and -. The printing program for the Gemini 10 will print any character as a subscript or superscript.

The test generator consists of two programs. The first program generates a file, allows loading or saving the file (tape or disk), adding to the file, editing the file, or deleting from the file. The second program formats the file for printing and prints the tests.

To create a file, load the program *MCQUIZ*. If you have Extended BASIC, the first time a program is run, you will have to type *PMODE 0:PCLEAR 1* before running or run the program twice. When the menu appears choose option two to create a new file. The screen will clear and you may begin typing in the questions. The computer will not allow input when executing the garbage routine, so you have to wait during this period. This will occur more often as the buffer becomes full so check the screen for loss of the cursor. If an error occurs, you can usually recover the file, if you immediately *GOTO 40*. Save the file before proceeding and then go ahead with option two. The maximum number of questions is set by the value of NQ in Line 25, the clear in Line 20, and RAM size. The questions may be up to 256 characters long including formatting. Therefore, you should limit questions to seven screen lines (224 characters). To get a subscript, press the down arrow key then the first character of the subscript. When the down arrow key is pressed, an arrow pointing to the left will be printed on the screen to indicate a subscript. For multiple subscripts you must do this for each character of the subscript. For superscripts the same procedure is used except you use the up-arrow key and an arrow pointing up is printed on the screen. When you finish the question, press the ENTER key and type in the answers to the question. The answers should not be more than two screen lines long to avoid problems during printing or editing. At the end of each answer press ENTER. If you have fewer than four answers just press ENTER for a blank answer. When all answers are completed you then press the number of the correct answer. A prompt will appear on the screen; to continue entering questions press any key except 'M' or 'E'. 'M' will return you to the main menu and 'E' will place you into the edit mode.

Once in the edit mode, the cursor can be moved by using the arrow keys. Holding the key down will move the cursor repeatedly. The character under the cursor may be changed by typing the new character. The character to the left of the cursor may be deleted by using the SHIFT left arrow combination. A character may be added to the left of the cursor by pressing CLEAR, then pressing the character to be added. Changes in superscripts and subscripts can be made in the above manner except for the arrow characters. The arrow characters can only be added by using the insert mode. Once all changes have been made press ENTER. The answers will appear one at a time for editing in the same manner as the questions. When finished with each answer, press the ENTER key. After the last answer you will be returned to the main menu.

When the question file is complete, return to the main menu and *SAVE* using option four. You will be given the choice of saving the file to either tape or disk. The saved file can be loaded back in using option one and edited(option six), added to (option two) or deleted from (option five). The delete routine uses the high speed *POKE*, if this does not work on your computer, delete Lines 1450 and 1490.

The second program will print the multiple choice tests. Load the program *PRTGEM* or *PRTVII* and run. If you have the 1.0 BASIC ROM, you must load

---

(Gary Kinney, a chemistry and physics teacher at Whitesboro Central High, has a master's degree in science. He also teaches computer programming to adults.)

the eight-bit driver program before running *PRTVII*. To load from tape, change the *OPEN"I",#1,N$* in Line 230 to *OPEN"I",#-1,N$*, all *INPUT#1* in Line 240 to 290 to *INPUT#-1* and *CLOSE#1* in Line 310 to *CLOSE#-1*. The program uses the high speed *POKE* during formatting. If this does not work on your computer, remove the following lines: *PRTGEM 320,500;PRTVII 140,170, 320,500*. You will be asked to enter the name of the question file. The computer will then load the file, format the questions to prevent word splitting and insert the codes for the superscripts and subscripts. When formatting is complete you will enter the number of questions on the test. The computer will then randomly select the questions, randomize its answers and print the questions 10 to a page. When printing is complete, you are given the option of printing another test. If you choose to print another test, you may print another test from the same file or add questions from another file to the questions already printed. Because of this last option, you may print a test of any length (maximum is value of TQ in Line 120) from several different files. The answers to the test will be printed on the next page at the end of each test.

These programs will work without Extended BASIC with the following changes:

MCQUIZ: for 16K change CLEAR (Line 20) to 6000 and NQ (Line 25) to 30.
Delete Lines 10, 780-810, 900-970, 990-1020, 1160-1290.
Change *LINEINPUT* to *INPUT* in Line 770 and 980.

PRTGEM or PRTVII: Make changes for tape input, for 16K RAM adjust NQ (Line 120) to 30 and CLEAR (Line 110) to 6000.
Delete Line 100.
Add

```
120 XX=RND(0):NQ=60:TQ=99
1080 FOR SS=B TO LEN(QQ$)
1085 IF MID$(QQ$,SS,1)=CHR$(94)THEN1100
1090 NEXT SS:RETURN
1170 FOR SS=B TO LEN (QQ$)
1175 IF MID$(QQ&,SS,1) =CHR$ (95)THEN1190
1180 NEXT SS:RETURN
```

I have question files for high school chemistry and physics. Each file contains 25 questions and there are 20 files for each subject. If you would like either of these question files with these programs, send $15, type of printer(Gemini 10 or LPVII), type of medium(tape or disk), whether you have Extended BASIC, and RAM size.

Line Description

LPVII

10-130	SET UP
140	HIGH SPEED POKE
150	READ SUPERSCRIPTS
160	READ SUBSCRIPTS
170	SLOW SPEED POKE
180-310	READ FILE
320	HIGH SPEED POKE
330-410	FORMAT FILE
420-490	RANDOMIZE QUESTIONS
500	SLOW SPEED POKE
510-720	PRINT QUESTIONS
730-820	CHOICE OF CONTINUING
830-890	RANDOMIZE ANSWERS
900-970	PRINT CORRECT ANSWERS
980-1030	SKIP TO NEXT PAGE
1040-1060	SAVE CORRECT RANDOM ANSWER
1070-1150	CODE SUPERSCRIPTS
1160-1220	CODE SUBSCRIPTS
1230-1330	FORMAT QUESTION LINE LENGTH
1340-1380	ANSWER PRINTING FORMAT
1390-1460	DATA FOR SUPERSCRIPTS AND SUBSCRIPTS
1470-1480	NAME PRINTING ROUTINE

PRTGEM

10-160	SET UP
180-310	INPUT FILE
320	HIGH SPEED POKE
330-410	FORMAT FILE
420-490	RANDOMIZE THE QUESTIONS
500	SLOW SPEED POKE
510-720	PRINTING TESTS
730-820	CHOICES OF CONTINUING
830-890	RANDOMIZE ANSWERS
900-970	PRINT CORRECT ANSWERS
1040-1060	SAVE CORRECT RANDOM ANSWER
1070-1150	CODE SUPERSCRIPTS
1160-1220	CODE SUBSCRIPTS
1230-1330	FORMAT LINE LENGTH
1340-1380	ANSWER PRINTING FORMAT

MCQUIZ

1-40	SET UP
50-140	MAIN MENU
160-430	INPUT ROUTINE
440-750	EDITOR
760-970	FILE INPUT
980-1290	FILE OUTPUT
1300-1370	INPUT THE CORRECT ANSWERS
1380-1495	DELETE ROUTINE
1450	HIGH SPEED POKE
1490	SLOW SPEED POKE
1500-1840	REPEATING CURSOR ROUTINES

Variables List

PRTGEM

Q$	Questions
AN$	Answers
RN	Random question
RA	Random answer
A	Answer printing format
CA	Correct answer
CB	Correct answer of random question
HT$	Horizontal tab
UL$	Start underline
UO$	Stop underline
DW$	Double width print on
DO$	Double width print off
NA$	Prints name and line
NQ	Maximum number of questions in file
TQ	Maximum number of questions on test
M	Number of questions in file

PRTVII

Q$	Questions
AN$	Answers
RN	Random question
RA	Random answer
A	Answer printing format

CA	Correct answer
CB	Correct random answer
SU$	Codes for superscript
SD$	Codes for subscripts
NQ	Maximum number of questions in file
TQ	Maximum number of questions on test
M	Number of questions in file

MCQUIZ

NQ	Number of questions in file
B$	Questions
AN$	Answers
CA	Correct answers
N	Number of questions

160	231	990	19
390	165	1240	71
590	167	1470	179
760	183	end	215

Listing 1:

```
1 '*****************************
2 '* MULTIPLE CHOICE TEST      *
3 '* OCTOBER 1983              *
4 '* GARY KINNEY               *
5 '* 10 WHITFORD AVENUE        *
6 '* WHITESBORO, NEW YORK 13492*
7 '*****************************
10 PMODE0:PCLEAR1
20 CLEAR 19500
25 NQ=60
30 DIM AN$(NQ,4),B$(NQ),CA(NQ)
40 SL=1055
50 CLS:PRINT@64,"     (1) LOAD FI
LE"
60 PRINT:PRINT"     (2) ADD TO FI
LE"
70 PRINT:PRINT"     (3) END"
80 PRINT:PRINT"     (4) SAVE FILE
"
90 PRINT:PRINT"     (5) DELETE FR
OM FILE"
100 PRINT:PRINT"     (6) EDIT FIL
E"
110 Z$=INKEY$:IF Z$="" THEN 110
120 Z=VAL(Z$):IF Z<1 OR Z>6 THEN
 110
130 IF N=0 AND Z>3 THEN 110
140 ON Z GOTO 760,160,150,980,13
80,440
150 CLS:END
160 CLS:N=N+1:B$(N)="":PRINT"QUE
STION";N
165 N=N+1:B$(N)="":PRINT"QUESTIO
N";N
170 PRINT CHR$(142);
180 A$=INKEY$:IF A$=""THEN 180
190 IF A$=CHR$(13) THEN 260
210 IF A$=CHR$(8) THEN B$(N)=LEF
T$(B$(N),LEN(B$(N))-1):GOTO240
220 IF A$=CHR$(10) THEN A$=CHR$(
95)
230 B$(N)=B$(N)+A$
240 PRINTCHR$(8);A$;CHR$(142);
250 GOTO 180
260 CLS
270 FOR I=1 TO 4
275 AN$(N,I)=""
280 PRINT:PRINT"ANSWER";I
290 PRINTCHR$(141);
300 A$=INKEY$:IF A$=""THEN300
310 IF A$=CHR$(13) THEN PRINTCHR
$(8):GOTO380
320 IF A$=CHR$(8) THEN AN$(N,I)=
LEFT$(AN$(N,I),LEN(AN$(N,I))-1):
GOTO 360
340 IF A$=CHR$(10) THEN A$=CHR$(
95)
350 AN$(N,I)=AN$(N,I) +A$
360 PRINTCHR$(8);A$;CHR$(141);
370 GOTO 300
380 NEXT I
390 GOSUB 1300
400 CLS:PRINT@128,"PRESS   M TO
RETURN TO MENU         E TO
EDIT                   ANY K
EY TO CONTINUE"
```

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→→→→→For COCO *IIs*, add "A" to part number.←←←←←

```
410 Z$=INKEY$:IF Z$=""THEN 410
420 IF Z$="M" OR Z$="m" THEN 50
425 IF Z$="E" OR Z$="e"  THEN M=
N:GOTO 460
430 GOTO160
440 CLS:PRINT@64,"QUESTION TO ED
IT FROM 1 TO";N
450 INPUT M:IF M<1 OR M>N THEN 4
40
460 CLS:LB$="QUESTION":PRINTLB$;
M
470 PRINTB$(M):B$=B$(M):LN=0:GOS
UB 550:B$(M)=B$
480 CLS:LB$="ANSWER":X=0:LN=0
490 FOR I=1 TO 4
500 PRINT@LN,LB$;I
510 PRINTAN$(M,I):B$=AN$(M,I):GO
SUB550:AN$(M,I)=B$
520 LN=LN+128:SL=SL+128:X=0
530 NEXT I
540 SL=1055:GOTO 50
550 IF X<1 THEN X=1:P=PEEK(SL+X)
560 Z$=INKEY$:POKE(SL+X),P
570 IF Z$=CHR$(9) AND X<LEN(B$)+
1 THEN GOSUB 1500:GOTO560
580 IF Z$=CHR$(94) AND X>32 THEN
 GOSUB1600:GOTO560
590 IF Z$=CHR$(12) THEN GOSUB680
:X=X+1:GOTO550
600 IF Z$=CHR$(10) AND X<LEN(B$)
-32 THEN GOSUB1800:GOTO560
610 IF Z$=CHR$(13) THEN RETURN
620 IF Z$=CHR$(8) AND X>1THEN GO
SUB1700:GOTO560
630 IF Z$=CHR$(21) AND X>1THEN B
$=LEFT$(B$,X-2)+RIGHT$(B$,LEN(B$
)-X+1):PRINT@LN+32,B$:X=X-1:GOTO
550
640 IF Z$<>"" AND LEN(B$)=>X AND
 Z$<>CHR$(12) AND Z$<>CHR$(8) AN
D Z$<>CHR$(21) AND Z$<>CHR$(10)A
NDZ$<>CHR$(94)  THEN GOSUB 720:X
=X+1:P=PEEK(SL+X):GOTO550
650 POKESL+X,207
660 FOR TD=1TO15:NEXT
670 GOTO 560
680 I$=INKEY$:POKESL+X,P:FORTD=1
TO15:NEXT:POKESL+X,207:IFI$=""TH
EN680
700 IF I$=CHR$(10) THEN I$=CHR$(
95)
710 B$=LEFT$(B$,X-1)+I$+RIGHT$(B
$,LEN(B$)-X+1):PRINT@LN+32,B$:RE
TURN
720 B$=LEFT$(B$,X-1)+Z$+RIGHT$(B
$,LEN(B$)-X):SC=ASC(Z$)
730 IF PEEK(282)<>255 THEN 750
740 IF SC>63 AND SC<97 THEN POKE
SL+X,SC:RETURN ELSE POKESL+X,SC+
64:RETURN
750 IF SC>63 AND SC<97 THEN POKE
SL+X,SC:RETURN ELSE IF SC>31 AND
 SC<64 THEN POKESL+X,(SC+64):RET
URN ELSE POKESL+X,(SC-96):RETURN
760 CLS:PRINT:PRINT
770 LINEINPUT"NAME OF FILE   ";N$
780 PRINT:PRINT:PRINT"  (1) DISK
 OR (2) TAPE"
790 Z$=INKEY$:IFZ$=""THEN790
800 Z=VAL(Z$):IF Z<1 OR Z>2 THEN
 790
810 IF Z=1 THEN 900
820 CLS:PRINT@228," READING TAPE
"
830 OPEN"I",#-1,N$:INPUT#-1,N
840 FOR I=1TON
850 INPUT#-1,B$(I),CA(I)
860 FORJ=1TO4:INPUT#-1,AN$(I,J):
NEXTJ
870 NEXT I
880 CLOSE#-1
890 GOTO40
900 CLS:PRINT@228," READING DISK
"
910 M$=LEFT$(N$,8)
920 OPEN"I",#1,M$:INPUT#1,N
930 FORI=1TO N
940 INPUT#1,B$(I),CA(I)
950 FOR J=1TO 4:INPUT#1,AN$(I,J)
:NEXT J
960 NEXT I
970 CLOSE#1:GOTO40
980 CLS:LINEINPUT"NAME OF FILE "
;N$
990 PRINT@128,"  (1) DISK OR (2)
 TAPE"
1000 Z$=INKEY$:IFZ$=""THEN1000
1010 Z=VAL(Z$):IF Z<1 ORZ>2 THEN
 1000
1020 IF Z=1 THEN 1160
1030 CLS:PRINT@128,"INSERT TAPE,
 PRESS PLAY AND      RECORD"
1040 PRINT:PRINT"PRESS ENTER WHE
N READY"
1050 Z$=INKEY$:IFZ$=""THEN 1050
1060 IF Z$<>CHR$(13) THEN 1050
1070 CLS:PRINT@224,"  LOADING TO
 TAPE"
1080 OPEN"O",#-1,N$
1090 PRINT#-1,N
1100 FORI=1TON
1110 PRINT#-1,B$(I),CA(I)
1120 FOR  J=1TO4:PRINT#-1,AN$(I,
J):NEXTJ
1130 NEXT I
1140 CLOSE#-1
1150 GOTO40
1160 CLS:PRINT@128,"INSERT DISK,
PRESS ENTER WHEN     READY"
1170 Z$=INKEY$:IFZ$=""THEN1170
1180 IF Z$<>CHR$(13) THEN 1170
1190 CLS:PRINT@223,"  SAVING DAT
A TO DISK"
1200 VERIFY ON
1210 M$=LEFT$(N$,8)
1220 OPEN"O",#1,M$
1230 WRITE#1,N
1240 FOR I=1TON
1250 WRITE#1,B$(I),CA(I)
1260 FORJ=1TO4:WRITE#1,AN$(I,J):
NEXTJ
1270 NEXT I
1280 CLOSE#1
1290 GOTO 40
1300 CLS
1310 FORI=1TO4
1320 PRINT"(";I") ";AN$(N,I)
1330 NEXT I
1340 PRINT:PRINT"TYPE NUMBER OF
CORRECT ANSWER"
1350 Z$=INKEY$:IF Z$=""THEN 1350
1360 Z=VAL(Z$):IF Z<1 OR Z>4 THE
N 1350
1370 CA(N)=Z:RETURN
1380 CLS:PRINT@64,"QUESTION TO D
ELETE FROM 1 TO";N
1390 INPUT M:IFM<0 OR M>N THEN 1
380
1400 CLS:PRINT"QUESTION";M
1410 PRINTB$(M)
1420 PRINT@448,"IS THIS THE CORR
ECT QUESTION?"
1430 Y$=INKEY$:IF Y$=""THEN 1430
1440 IF Y$<>"Y" AND Y$<>"y" THEN
 40
1445 IF M=NQ THEN 1490
1450 POKE65495,0
1455 FOR D=M TO N-1
1460 B$(D)=B$(D+1):CA(D)=CA(D+1)
1470 FOR E=1 TO 4:AN$(D,E)=AN$(D
+1,E):NEXT E
1480 NEXT D
1490 POKE65494,0
1495 N=N-1:GOTO40
1500 FORTD=1TO25:NEXTTD:X=X+1:P=
PEEK(SL+X):POKESL+X,207
1510 IF PEEK(344)<>247 OR X>LEN(
B$) THEN RETURN
1520 POKESL+X,P:X=X+1:P=PEEK(SL+
X):POKESL+X,207
1530 FORTD=1TO10:NEXT TD
1540 POKESL+X,P:GOTO1510
1600 FORTD=1TO25:NEXTTD:X=X-32:P
=PEEK(SL+X):POKESL+X,207
1610 IF PEEK(341)<>247 OR X<32 T
HEN RETURN
```

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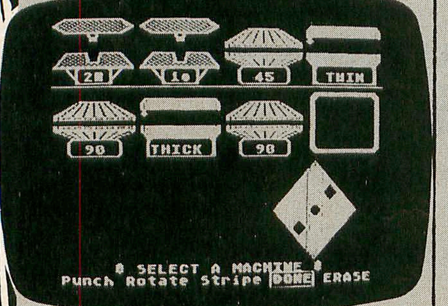

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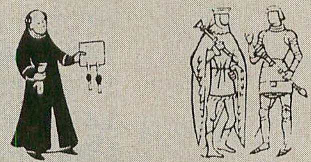

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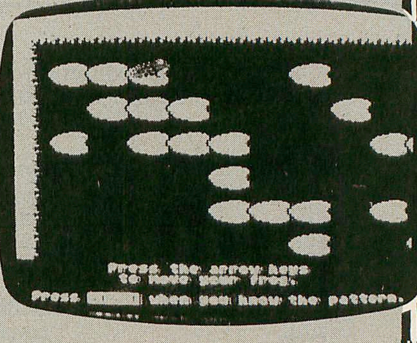

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```
1620 POKESL+X,P:X=X-32:P=PEEK(SL
+X):POKESL+X,207
1630 FORTD=1TO10:NEXT TD
1640 POKESL+X,P:GOTO1610
1700 FORTD=1TO25:NEXTTD:X=X-1:P=
PEEK(SL+X):POKESL+X,207
1710 IF PEEK(343)<>247 OR X<2 TH
EN RETURN
1720 POKESL+x,P:X=X-1:P=PEEK(SL+
X):POKESL+X,207
1730 FORTD=1TO10:NEXT TD
1740 POKESL+X,P:GOTO1710
1800 FORTD=1TO25:NEXTTD:X=X+32:P
=PEEK(SL+X):POKESL+X,207
1810 IF PEEK(342)<>247 OR X>LEN(
B$)-32 THEN RETURN
1820 POKESL+X,P:X=X+32:P=PEEK(SL
+X):POKESL+X,207
1830 FORTD=1TO10:NEXT TD
1840 POKESL+X,P:GOTO1810
```

200	175
460	60
700	1
950	89
1210	163
END	201

Listing 2:

```
10 '*******************************
20 '* PRINTING TEST LPVII         *
30 '* OCTOBER 1983                *
40 '* GARY KINNEY                 *
50 '* 10 WHITFORD AVENUE          *
60 '* WHITESBORO,NEW YORK 13492*
70 '*******************************
100 PMODE0:PCLEAR1
110 CLEAR 19500
120 XX=RND(TIMER):NQ=60:TQ=99:CL
S
130 DIM Q$(NQ),AN$(NQ,4),RA(NQ),
RN(NQ),A(NQ),CA(NQ),CB(TQ),SU$(1
1),SD$(10)
140 POKE65495,0
150 FOR I=0TO11:SU$(I)=CHR$(18):
FORJ=1TO5:READS:SU$(I)=SU$(I)+CH
R$(S):NEXTJ:SU$(I)=SU$(I)+CHR$(1
28)+CHR$(30):NEXTI
160 FOR I=0 TO 9:SD$(I)=CHR$(18)
:FORJ=1TO5:READS:SD$(I)=SD$(I)+C
HR$(S):NEXTJ:SD$(I)=SD$(I)+CHR$(
128)+CHR$(30):NEXTI
170 POKE65494,0
180 CLS:PRINT"READ DATA DISK":PR
INT
190 PRINT"INSERT DISK":PRINT
200 PRINT"PRESS ENTER WHEN READY
":PRINT
210 A$=INKEY$:IF A$<>CHR$(13) TH
EN 210
220 PRINT:INPUT"NAME OF DATA FIL
E";N$:PRINT
230 CLS:PRINT@226,"DATA FILE BEI
NG READ":OPEN"I",#1,N$
240 INPUT#1,M
250 FOR I=1 TO M
260 INPUT#1,Q$(I)
270 INPUT#1,CA(I)
280 FOR J=1 TO 4
290 INPUT#1,AN$(I,J)
300 NEXT J,I
310 CLOSE#1
320 POKE65495,0
330 CLS:PRINT@137,"FORMATING DAT
A"
340 PRINT@262,"QUESTION NUMBER"
350 FOR I=1 TO M
360 GOSUB 1230
370 QQ$=Q$(I):GOSUB 1070:GOSUB 1
160:Q$(I)=QQ$
380 GOSUB 1340
390 FOR F=1 TO 4:QQ$=AN$(I,F):GO
SUB1070:GOSUB1160:AN$(I,F)=QQ$
400 NEXT F
410 NEXT I
420 CLS:PRINT@226,"NUMBER OF QUE
STIONS UP TO";M;
430 INPUT N
440 FOR I=1 TO N
450 RN(I)=RND(M)
460 FOR J=1 TO (I-1)
470 IF I=1 THEN 490
480 IF RN(I)=RN(J) THEN 450
490 NEXTJ,I
500 POKE65494,0
510 CLS:PRINT@229,"PLEASE WAIT P
RINTING"
520 IF SF=0 THEN GOSUB 1470
530 FOR I=1 TO N
540 PRINT#-2:PL=PL+1
550 PRINT#-2,CHR$(18);CHR$(28);C
HR$(30);CHR$(192);
560 PRINT#-2,CHR$(31);I+SF;CHR$(
30);CHR$(16);"14";Q$(RN(I))
570 PL=PL+INT(LEN(Q$(RN(I)))/66)
+1
580 CB(I+SF)=CA(RN(I))
590 GOSUB 830
600 GOSUB 1040
610 IF A(RN(I))=2 THEN 650
620 PRINT#-2,"       (1)";AN$(RN(
I),RA(1));CHR$(16);"45";"(2)";AN
$(RN(I),RA(2)):PL=PL+1
630 PRINT#-2,"       (3)";AN$(RN(
I),RA(3));CHR$(16);"45";"(4)";AN
$(RN(I),RA(4)):PL=PL+1
640 GOTO 680
```

```
650 FOR J=1 TO 4
660 PRINT#-2,"       (";J;")";AN$
(RN(I),RA(J)):PL=PL+1
670 NEXT J
680 TEN=(I+SF)/10-INT((I+SF)/10)
690 IF TEN=0 THEN GOSUB 980
700 IF TEN=0 AND INT((I+SF)/10)=
(N+SF)/10 THEN G=1 ELSE G=2
710 NEXT I
720 CLOSE#-2
730 CLS:PRINT@226,"WOULD YOU LIK
E ANOTHER RUN"
740 PRINT"TYPE Y(YES) OR N(NO)"
750 Z$=INKEY$:IF Z$="" THEN 750
760 IF Z$<>"Y" THEN 810
770 PRINT:PRINT"(S) SAME FILE OR
 (N) NEW FILE"
780 F$=INKEY$:IF F$="" THEN 780
790 IF F$="S" THEN GOSUB 900:SF=
0:GOTO 420
800 IF F$="N" THEN SF=SF+N:GOTO2
20 ELSE 780
810 IF Z$<>"N" THEN 750
820 CLS:GOSUB900:PRINT@230,"PRIN
TING COMPLETE";:END
830 FOR K=1 TO 4
840 RA(K)=RND(4)
850 FOR L=1 TO (K-1)
860 IF K=1 THEN 880
870 IF RA(K)=RA(L) THEN 840
880 NEXT L,K
890 RETURN
900 IF G=2 THEN GOSUB 980
910 FOR K=1 TO 5:PRINT#-2:NEXT K
:PL=PL+5
920 PRINT#-2,CHR$(31);"ANSWERS T
O QUESTIONS";CHR$(30):PL=PL+1
930 FOR I=1 TO N+SF
940 PRINT#-2,I;")"CB(I):PL=PL+1
950 NEXT I
960 PRINT#-2:PL=PL+1:GOSUB 980
970 RETURN
980 IF PL>=66 THEN 1030
990 PN=71-PL
1000 FOR K=1 TO PN
1010 PRINT#-2
1020 NEXT K
1030 PL=5:RETURN
1040 FOR J=1 TO 4
1050 IF AN$(RN(I),CB(I+SF))=AN$(
RN(I),RA(J)) THEN CB(I+SF)=J:RET
URN
1060 NEXT J
1070 B=1:PRINT@279,I
1080 SS=INSTR(B,QQ$,CHR$(94))
1090 IF SS=0 THEN RETURN
1100 SS$=MID$(QQ$,SS+1,1)
1110 IF SS$="+" THEN C$=SU$(10):
GOTO1140
```

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```
1120 IF SS$="-" THEN C$=SU$(11):
GOTO1140
1130 SV=VAL(SS$):C$=SU$(SV)
1140 QQ$=LEFT$(QQ$,SS-1)+C$+MID$
(QQ$,SS+2)
1150 B=SS+2:GOTO 1080
1160 B=1
1170 SS=INSTR(B,QQ$,CHR$(95))
1180 IF SS=0 THEN RETURN
1190 SS$=MID$(QQ$,SS+1,1)
1200 SV=VAL(SS$):C$=SD$(SV)
1210 QQ$=LEFT$(QQ$,SS-1)+C$+MID$
(QQ$,SS+2)
1220 B=SS+2:GOTO1170
1230 Q$=Q$(I):E$="":LN=0
1240 IF LEN(Q$)<(67+LN) THEN Q$(
I)=E$+Q$:RETURN
1250 A$=LEFT$(Q$,(66+LN))
1260 FOR L=(66+LN)TO 1 STEP -1
1270 C$=MID$(A$,L,1)
1280 IF C$=" " THEN 1300
1290 NEXT L
1300 D$=LEFT$(A$,L)+CHR$(13)+CHR
$(16)+"06"
1310 Q$=RIGHT$(Q$,LEN(Q$)-L):IF
LN=0 THEN LN=3
1320 E$=E$+D$
1330 GOTO 1240
1340 FOR K=1 TO 4
1350 AL=LEN(AN$(I,K))
1360 IF AL >30 THEN A(I)=2
1370 NEXT K
1380 RETURN
1390 DATA 128,142,145,145,142,12
8,128,146,159,144,128,146,153,15
1,144
1400 DATA 128,145,149,149,155,12
8,135,132,159,132,128,151,149,14
9,137
1410 DATA 128,142,149,149,136,12
8,131,129,157,131,128,138,149,14
9,138
1420 DATA 128,130,149,149,142,12
8,128,132,142,132,128,128,132,13
2,132
1430 DATA 128,184,196,196,184,12
8,128,200,252,192,128,200,228,22
0,192
1440 DATA 128,196,212,212,236,12
8,156,144,252,144,128,220,212,21
2,164
1450 DATA 128,184,212,212,160,12
8,140,132,244,140,128,168,212,21
2,168
1460 DATA 128,136,212,212,184
1470 FOR K=1 TO 4:PRINT#-2:NEXTK
1480 PRINT#-2,CHR$(31);"NAME ";C
HR$(18);CHR$(28);CHR$(255);CHR$(
192);CHR$(30):RETURN
```

230	221
480	151
710	189
1050	136
END	201

Listing 3:

```
10 '*****************************
20 '* PRINTING TEST GEMINI 10   *
30 '* OCTOBER 1983              *
40 '* GARY KINNEY               *
50 '* 10 WHITFORD AVENUE        *
60 '* WHITESBORO,NEW YORK 13492*
70 '*****************************
100 PMODE0:PCLEAR1
110 CLEAR 20000:POKE150,1:PRINT#
-2,CHR$(27);"@";
120 XX=RND(TIMER):NQ=60:TQ=99
130 DIM Q$(NQ),AN$(NQ,4),RA(NQ),
RN(NQ),A(NQ),CA(NQ),CB(TQ)
140 HT$=CHR$(9):UL$=CHR$(27)+"-"
+CHR$(1):UO$=CHR$(27)+"-"+CHR$(0
):DW$=CHR$(14):DO$=CHR$(20)
150 NA$=DW$+"NAME "+DO$+UL$+"

      "+UO$
160 PRINT#-2,CHR$(27);"D";CHR$(6
);CHR$(45);CHR$(0);CHR$(27);CHR$
(82);CHR$(3);
180 CLS:PRINT"READ DATA DISK":PR
INT
190 PRINT"INSERT DISK":PRINT
200 PRINT"PRESS ENTER WHEN READY
":PRINT
210 A$=INKEY$:IF A$<>CHR$(13) TH
EN 210
220 PRINT:INPUT"NAME OF DATA FIL
E";N$:PRINT
230 CLS:PRINT@226,"DATA FILE BEI
NG READ":OPEN"I",#1,N$
240 INPUT#1,M
250 FOR I=1 TO M
260 INPUT#1,Q$(I)
270 INPUT#1,CA(I)
280 FOR J=1 TO 4
290 INPUT#1,AN$(I,J)
300 NEXT J,I
310 CLOSE#1
320 POKE65495,0
330 CLS:PRINT@137,"FORMATING DAT
A"
340 PRINT@262,"QUESTION NUMBER"
350 FOR I=1 TO M
360 GOSUB 1230
370 QQ$=Q$(I):GOSUB 1070:GOSUB11
```

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Signature ______________________________

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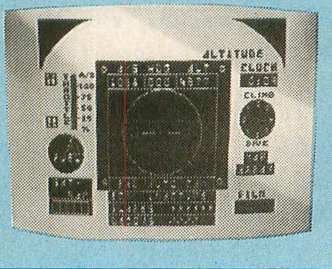
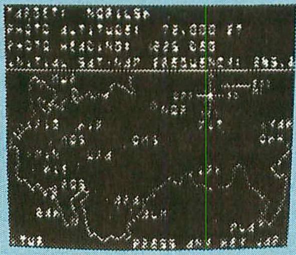
```
60:Q$(I)=QQ$
380 GOSUB1340
390 FORF=1TO4:QQ$=AN$(I,F):GOSUB
1070:GOSUB1160:AN$(I,F)=QQ$
400 NEXT F
410 NEXT I
420 CLS:PRINT@226,"NUMBER OF QUE
STIONS UP TO ";M;
430 INPUT N
440 FOR I=1 TO N
450 RN(I)=RND(M)
460 FOR J=1 TO (I-1)
470 IF I=1 THEN 490
480 IF RN(I)=RN(J) THEN 450
490 NEXT J,I
500 POKE65494,0
510 CLS:PRINT@229,"PLEASE WAIT P
RINTING"
520 IF SF=0 THEN PRINT#-2,NA$:PR
INT#-2
530 FOR I=1 TO N
540 PRINT#-2
550 PRINT#-2,UL$;"    ";UO$;
560 PRINT#-2,DW$;I+SF;DO$;Q$(RN(
I))
580 CB(I+SF)=CA(RN(I))
590 GOSUB 830
600 GOSUB 1040
610 IF A(RN(I))=2 THEN 650
620 PRINT#-2,"     (1)";AN$(RN(
I),RA(1));HT$;"(2)";AN$(RN(I),RA
(2))
630 PRINT#-2,"     (3)";AN$(RN(
I),RA(3));HT$;"(4)";AN$(RN(I),RA
(4))
640 GOTO 680
650 FOR J=1 TO 4
660 PRINT#-2,"     (";J;")";AN$
(RN(I),RA(J))
670 NEXT J
680 TEN=(I+SF)/10-INT((I+SF)/10)
690 IF TEN=0 THEN PRINT#-2,CHR$(
12);
700 IF TEN=0 AND (I+SF)/10=INT(N
+SF)/10 THEN G=1 ELSE G=2
710 NEXT I
720 CLOSE#-2
730 CLS:PRINT@226,"WOULD YOU LIK
E ANOTHER RUN"
740 PRINT"TYPE Y(YES) OR N(NO)"
750 Z$=INKEY$:IF Z$=""THEN 750
760 IF Z$<>"Y" THEN 810
770 PRINT:PRINT"(S)SAME FILE OR
(N)NEW FILE"
780 F$=INKEY$:IFF$=""THEN 780
790 IF F$="S" THEN GOSUB900:SF=0
:GOTO420
800 IF F$="N" THEN SF=SF+N:GOTO
220 ELSE 780
```

```
810 IF Z$<>"N" THEN 750
820 CLS:GOSUB900:PRINT@230,"PRIN
TING COMPLETE";:END
830 FOR K=1 TO 4
840 RA(K)=RND(4)
850 FOR L=1 TO (K-1)
860 IF K=1 THEN 880
870 IF RA(K)=RA(L) THEN 840
880 NEXT L,K
890 RETURN
900 IF G=2 THEN PRINT#-2,CHR$(12
);
920 PRINT#-2,DW$;"ANSWERS TO QUE
STIONS"
930 FOR I=1 TO N+SF
940 PRINT#-2,I;")"CB(I)
950 NEXT I
960 PRINT#-2,CHR$(12);
970 RETURN
1040 FOR J=1 TO 4
1050 IF AN$(RN(I),CB(I+SF))=AN$(
RN(I),RA(J)) THEN CB(I+SF)=J:RET
URN
1060 NEXT J
1070 B=1:PRINT@279,I
1080 SS=INSTR(B,QQ$,CHR$(94))
1090 IF SS=0 THEN RETURN
1100 C$=MID$(QQ$,SS+1,1)
1140 QQ$=LEFT$(QQ$,SS-1)+CHR$(27
)+"S"+CHR$(0)+C$+CHR$(27)+"T"+CH
R$(27)+"H"+MID$(QQ$,SS+2)
1150 B=SS+2:GOTO1080
1160 B=1
1170 SS=INSTR(B,QQ$,CHR$(95))
1180 IF SS=0 THEN RETURN
1190 C$=MID$(QQ$,SS+1,1)
1210 QQ$=LEFT$(QQ$,SS-1)+CHR$(27
)+"S"+"1"+C$+CHR$(27)+"T"+CHR$(2
7)+"H"+MID$(QQ$,SS+2)
1220 B=SS+2:GOTO1170
1230 Q$=Q$(I):E$="":LN=0
1240 IF LEN(Q$)<(67+LN) THEN Q$(
I)=E$+Q$:RETURN
1250 A$=LEFT$(Q$,(66+LN))
1260 FOR L=(66+LN)TO 1 STEP -1
1270 C$=MID$(A$,L,1)
1280 IF C$=" " THEN 1300
1290 NEXT L
1300 D$=LEFT$(A$,L)+CHR$(13)+CHR
$(9)
1310 Q$=MID$(Q$,L+1):IF LN=0 THE
N LN=3
1320 E$=E$+D$
1330 GOTO 1240
1340 FOR K=1 TO 4
1350 AL=LEN(AN$(I,K))
1360 IF AL >30 THEN A(I)=2
1370 NEXT K
1380 RETURN
```

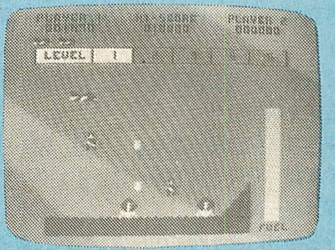




SR-71

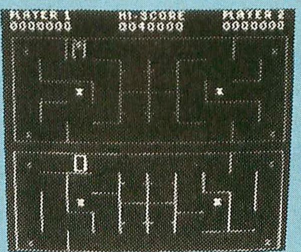
SR-71 is a fast action game in which you are the pilot on a mission to take photographs of missile sites in Russia and deliver them to our processing laboratory in Japan. So real you will feel as if you are in the cockpit on a real spy mission. Elude Russian missiles as well as their detection devices. Another Tom Mix exclusive. A must for the adventurous. Fantastic graphics, color and sound. **32K Ext. Basic** **TAPE $28.95** **DISK $31.95**

SKRAMBLE



Your mission is to penetrate the enemy skramble system and destroy their headquarters. You will start with three of our latest spacefighters equipped with repeating cannon and twin bomb launcher. If you succeed in evading the elaborate ground defenses, you will arrive at the Cave where flying becomes more difficult. In the cave are UFOs, after which you must avoid a hail of meteorites. Very few pilots succeed this far, but if you do, then you must enter the Fortress, followed by the Maze. One or two player game. Machine Language, high speed, Arcade action. Full color graphics with sound. Keyboard or joystick control.

16K MACHINE LANGUAGE **TAPE $24.95** **DISK $27.95**



GRABBER

A pac type game. Two complete mazes jump from one to the other. Probably the most outstanding sound you have ever heard. Arcade Action. Method of play, you are the Grabber. The object is to grab the 8 treasures and store them in the center boxes. You start with 3 Grabbers and get extra ones at 20,000 points. Watch out for the googlies! Super high resolution graphics.

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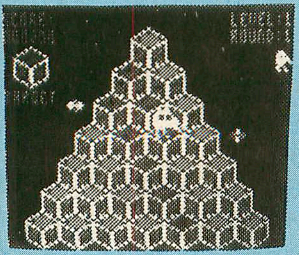
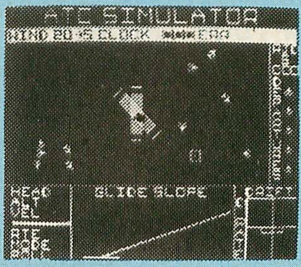


CU✻BER

Approaches the excitement and challenges of any Video Arcade. The hazards of CU✻BER are many. Help CU✻BER change the colors on the pyramid while avoiding many of the dangers always present. Vipers, the Nurd, the Dork, bonus points all add up to another exciting release from Tom Mix Software.

32K MACHINE LANGUAGE
TAPE $27.95 **DISK $30.95**



AIR TRAFFIC CONTROLLER

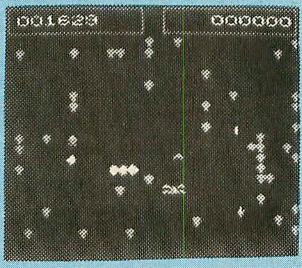
Air Traffic Controller is a computer model of an air traffic control situation for the TRS-80 Color Computer. Remotely Piloted Vehicles (RPV's) are operated by the controller in a situation similar to that of a commercial airline in that you must regulate landings and takeoffs of the vehicles.

32K EXT. BASIC
TAPE $28.95 **DISK $31.95**

KATERPILLAR II

The color computer has needed a perfect centipede type game since day one. You will throw all imitations aside when you see this. So close to the arcade you will start digging for quarters. Grapic to equal "The King" and "Buzzard Bait." Joysticks required.

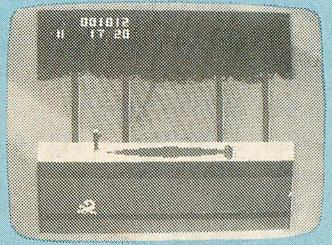
16K MACHINE LANGUAGE
TAPE $24.95 **DISK $27.95**

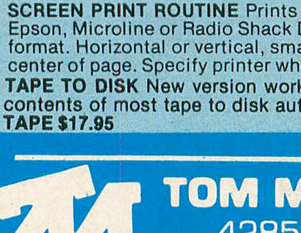


TRAPFALL

The "Pitfalls" in this game are many. Hidden treasures, jump over the pits, swing on the vine, watch out for alligators, beware of the scorpion. Another game for the Color Computer with the same high resolution graphics as "The King."

16K MACHINE LANGUAGE
TAPE $27.95 **DISK $30.95**





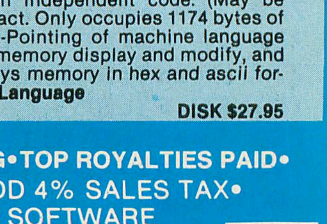
FANGMAN

Fangman is a high-resolution graphics arcade-type game based on the Dracula legend. Plot of Game: You're Dracula in your castle, stalking through a labrynth of passages in search of invading villagers seeking to destroy you by blocking your every path with deadly crosses. Their ally the Sun also wanders your halls, trying to touch you and turn you to bones and dust. Fortunately, you have allies of your own, the vampire bats who cahse down the villagers, holding them till you arive. Joysticks required. **16K MACHINE LANGUAGE**
TAPE $24.95 **DISK $27.95**

BUZZARD BAIT

We've done it again. You thought The King was great? Wait til you see this!! Outstanding high resolution graphics, tremendous sound make this "joust" type game a must for your software collection. As you fly from cloud to cloud you will enjoy sky high excitement dealing with the challenges presented to you by this newest release by Tom Mix Software. Joysticks required.

32K MACHINE LANGUAGE
TAPE $27.95 **DISK $30.95**



UTILITIES

SCREEN PRINT ROUTINE Prints contents of your graphic screen to an Epson, Microline or Radio Shack DMP Printers. Prints positive or reverse format. Horizontal or vertical, small and large printout. Print left, right or center of page. Specify printer when ordering. **TAPE $19.95** **DISK $21.95**

TAPE TO DISK New version works on both 1.0 and 1.1 DOS. Load the contents of most tape to disk automatically. **Machine Language**
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COLOR MONITOR Written in position independent code. (May be located in any free memory). Very compact. Only occupies 1174 bytes of memory. Full featured, includes Break-Pointing of machine language programs, register display and modify, memory display and modify, and block memory move commands. Displays memory in hex and ascii format on one line 8 bytes long. **Machine Language**
TAPE $24.95 **DISK $27.95**

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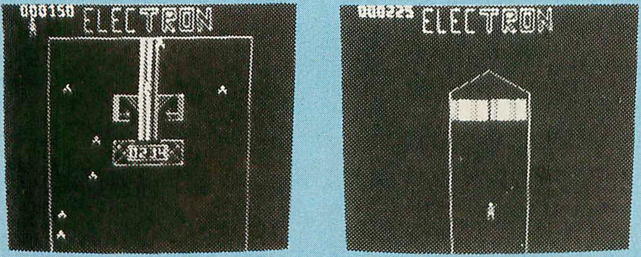
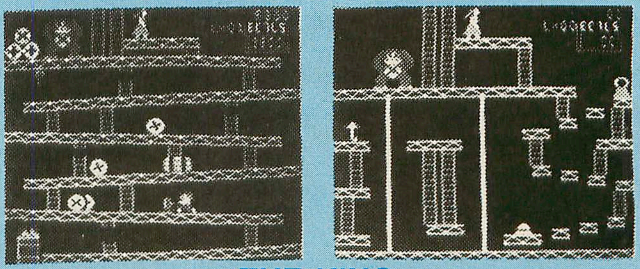
VIP Disk-ZAP™
Repairs crashed disks.
16K DISK $49.95 Lowercase displays not available with this program.



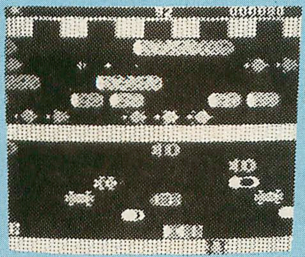
ELECTRON

Electron is composed of four subgames. You must complete one level in order to advance to the next. Supplied with four men, you are subjected to more difficult games as you move ahead. Beam Buggy, Prachnids, Force Fields and a Maze!
JOYSTICKS REQUIRED, 16K MACHINE LANGUAGE
TAPE $24.95 DISK $27.95



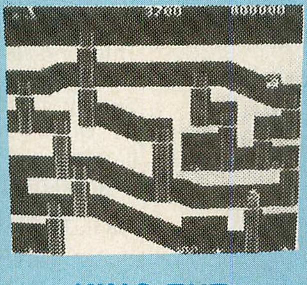
THE KING

This game contains all 4 full graphic screens like the popular arcade game. Exciting sound and realistic graphics. Never before has the color computer seen a game like this. Early reviews say simply outstanding. **JOYSTICKS REQUIRED**
32K MACHINE LANGUAGE
TAPE $26.95 DISK $29.95



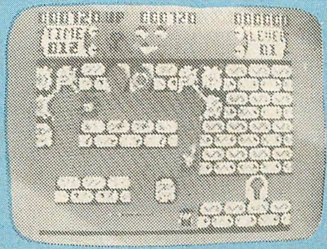
THE FROG

This one will give you hours of exciting play. Cross the busy highway to the safety of the median and rest awhile before you set out across the swollen river teaming with hidden hazards. Outstanding sound and graphics. Play from keyboard or joysticks.
16K MACHINE LANGUAGE
TAPE $27.95 DISK $30.95



KING TUT

Journey through the caverns of King Tut's tomb. You are on a quest to find treasures hidden in the cavrns below. You light your way with only a small candle that grows dimmer as time passes. Watch out for the snakes and the ghost of King Tut himself. **Five** screens challenge your abilities every step of the way. Joysticks required.
16K MACHINE LANGUAGE
TAPE $27.95 DISK $30.95



THE TOUCHSTONE

You are one of many priests of Ra who has accepted the challenge of the touchstone. The challenge is a way for any of Ra's followers to become a favored high priest. Given limited use of Ra's powers, you will battle hidden dangers. Entering the mazes, you must be ready for anything.
32K MACHINE LANGUAGE
TAPE $27.95 DISK $30.95

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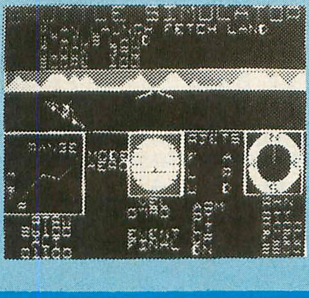
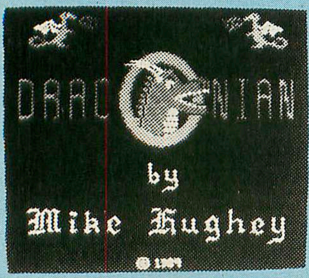
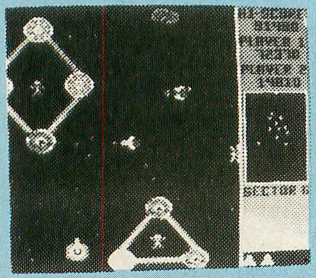
SPACE SHUTTLE



This program gives you the real feeling of flight. Full instrumentation complete to the max. Radar, altimeter, air speed, artificial horizon, fuel gauge, a mission status panel and much more. Actual simulation of space flight, weather conditions must be considered.
JOYSTICKS REQUIRED
32K EXTENDED BASIC
TAPE $28.95 DISK $31.95





DRACONIAN

You brace yourself as your ship materializes in the enemy sector. Your engine roars to life, and you consult the long-range scanner for the position of the nearest enemy base. As you head for the base, blasting asteroids and space-mines in your path, you suddenly notice a monstrous space-dragon looming before you. Reacting quickly, you dodge his deadly fire-breath and blast him out of existence.

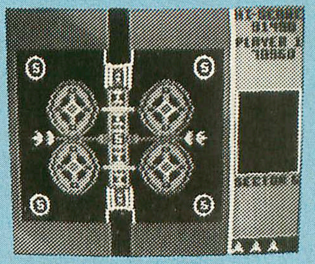
Finally, the enemy base comes into view. Avoiding the enemy fire, you destroy the gun turrets one by one with your rapid-fire torpedoes. Then, with the explosions still echoing around you, you rescue the astronaut who was being held prisoner by the enemy. Your mission is far from over, however, as there are more bases to destroy and more astronauts to rescue before the sector will be secured. And all must be done quickly; if you are too slow, the invincible DRACONIAN will surely seek you out as its next victim.

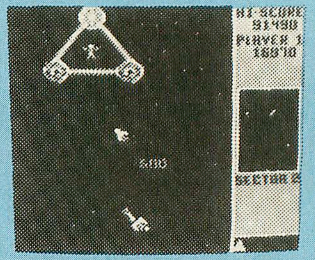
This is it — the single most impressive, awe-inspiring arcade game you can buy for your Color Computer. High-resolution graphics, awesome sound effects, four-voice music, and quality you have to see to believe! Experience the realism of DRACONIAN today!

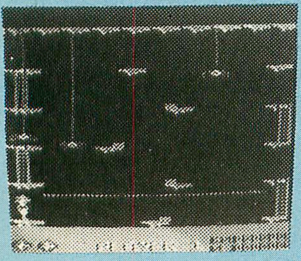
JOYSTICKS REQUIRED

32K MACHINE LANGUAGE

TAPE $27.95 **DISK $30.95**







CRASH

This game is a high resolution Machine Language program with outstanding Arcade type graphics. The game consists of 4 screens. Fly the airplane over and through obstacles. Piloted by "Mario" who also appeard in "The King". The object is to conquer one screen after another but don't "Crash". Great fun for the whole family. For 1 or 2 players. Uses joysticks.

32K MACHINE LANGUAGE

TAPE $24.95 **DISK $27.95**

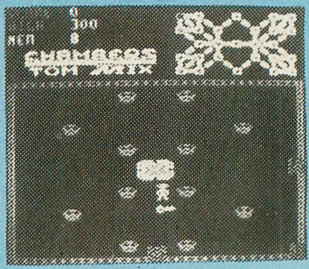
CHAMBERS

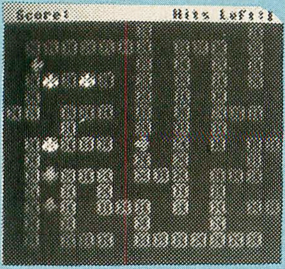
Exciting high resolution graphics game. Multiple screens. Outstanding sound, Chambers is loosely based on Cosmic Chasm. The object in each level is to destroy all of the evil creatures in each room and then go into the main reactor room and blow up the base.

JOYSTICKS REQUIRED

32K MACHINE LANGUAGE

TAPE $24.95 **DISK $27.95**





WAREHOUSE MUTANTS

Journey through the warehouse seeking out the Mutants who are out to destroy you. WATCH OUT! They will push crates trying to crush you! Outstanding realism—high resolution graphics—multiple screens.

JOYSTICKS REQUIRED

16K MACH. LANGUAGE

TAPE $24.95

DISK $27.95

QUIX

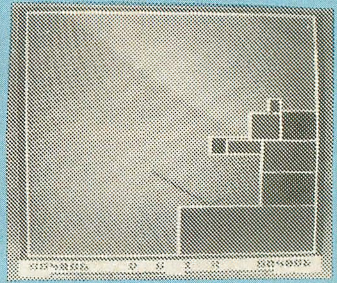
This one is after a popular arcade game with a similar name. Simply frustrating—you'll love it. Done in high resolution graphics with Super Sound.

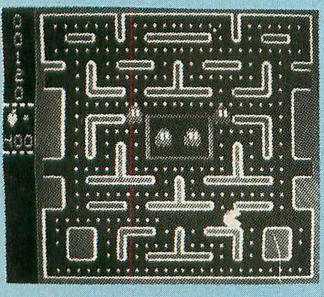
JOYSTICKS REQUIRED

32K MACH. LANGUAGE

TAPE $24.95

DISK $27.95





MS. MAZE

MS. MAZE is remarkable in that it combines brilliant color, high resolution, detailed graphics, and music with a very playable game. Anything that could be done to make the Color Computer look and play like the arcade version has been done. MS. MAZE is without question the closest thing to the arcade Pac games that I have seen for the Coco.

JOYSTICKS REQUIRED

32K MACHINE LANGUAGE

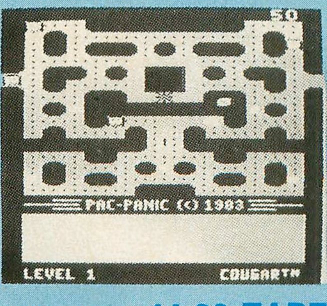
TAPE $24.95 **DISK $27.95**

PAK-PANIC

Pakman is steered thru a maze eating dots and powerpills. Pakman is pursued by four monsters who try to catch and kill him. If Pakman eats a powerpill he becomes powerful and can eat monsters. Monsters try to avoid a powerful Pakman. As monsters are eaten their ghosts appear on the top of the screen. When seven ghosts have appeared one will fly across the screen or they will link together forming a centipede that will travel thru the maze. Pakman has no power against ghosts and centipedes and must avoid them or be killed. **JOYSTICKS REQUIRED**

32K MACHINE LANGUAGE

TAPE $24.95 **DISK $27.95**



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EDUCATIONAL

VOCABULARY MANAGEMENT SYSTEM

16K Extended basic/32K for printer output TAPE $39.95 DISK $42.95

The Vocabulary Management System (VMS) is a series of programs designed to aid a parent or teacher in helping children to learn and practice using vocabulary and spelling words. The 9 programs that comprise the VMS include a full feature data entry/edit program, three printer output programs and 5 vocabulary/spelling game programs. The system's many outstanding features include:

—As many as 300 vocabulary words and definitions may be in the computer's memory at one time.

—Words and definitions may be saved on disk or tape.

—Remarks and/or comments can be saved with word files.

—A disk loading menu allows students to load disk files without typing file names.

—Word lists may be quickly alphabetized

—The three printer segments allow you to create and print individualized tests, puzzles, word-searches and worksheets.

—Answer keys may be printed for all worksheets and puzzles.

—The printer segments allow full use of your printer's special features.

—The 5 game programs are based on sound educational principles and provide practice in identifying words and matching them with their definitions in a fast-paced set of activities.

STORY PROBLEMS

STORY PROBLEMS is a program that is designed to give practice in solving story problems (sometimes called statement thought or word problems) on the Color Computer. It is suitable for use in either a home or school environment. It is also a tool that will allow you to create new story problems to suit your children's needs and ability levels. It has many features that make it particularly attractive:

- Story problems involving addition, subtraction, multiplication, division or a combination of the four are presented to the student by slowly scrolling each letter of each problem onto the screen.
- Up to 5 students may use the program at the same time.
- There are 4, user modifiable, skill levels.

16K EXT. BASIC TAPE $19.95 DISK $22.95

MATH DRILL

MATH DRILL is a program designed to help children to practice addition, subtraction, multiplication and division skills on the Color Computer. It has several features that make its use particularly attractive:

- Up to 6 students may use the program at the same time.
- Answers for addition, subtraction and multiplication are entered from right to left, just as they are written on paper.
- Commas may be included in the answers.
- Partial products for the multiplication problems may be computed on the screen.
- Division answers that have a remainder are entered as a whole number followed by the letter "R" and the remainder.
- The are ten, user modifiable, skill levels.
- A "SMILEY FACE" is used for motivation and reward. Its size increases relative to the skill level.
- Skill levels automatically adjust to the student's ability.
- A timer measures the time used to answer each problem and the total time used for a series of problems.
- After a problem has been answered incorrectly the correct answer appears under (above in division) the incorrect answer.

REQUIRES 16K EXT. BASIC
TAPE $19.95 DISK $22.95

ESTIMATE

ESTIMATE is a program designed to help children to practice estimating the answers to addition, subtraction, multiplication and division problems on the Color Computer. It has many features that make its use particularly attractive:

- Up to 5 students may use the program at the same time.
- There are 5, user modifiable, skill levels.
- The acceptable percent error may be changed as a student's skill improves.
- A timer measures the number of seconds used to answer each problem and the total time used for a series of problems.
- If a problem has been answered incorrectly, the student is told the percent error and asked to try again.
- If a problem is answered incorrectly a second time, the student is told the correct answer and the range of acceptable answers is displayed.
- A report is given at the end of each set of problems that includes the number of problems done, the number of problems answered correctly on the first try and the average percent error.
- The (BREAK) key has been disabled so that a child will not inadvertently stop the program from running.

REQURIES 16K EXT. BASIC
TAPE $19.95 DISK $22.95

TEACHER'S DATABASE

TEACHER'S DATABASE is a program designed to allow a teacher to keep a computerized file of information about his/her students. There are many features that make this program particularly attractive:

- Information on as many as 100 students (or more) may be in the computer at one time.
- Each student may have as many as 20 (or more) individual items of data in his/her record.
- The program will run from cassette or disk.
- Cassette and disk files are completely compatible.
- The program is menu driven.
- Records may be easily changed, deleted, combined or added.
- Information about students may be numerical or text.
- Records may be quickly alphabetized.
- Records may be sorted by various criteria.
- Records may be reordered (ranked) based on test scores or other data.
- Data displayed during a sort may be printed on a printer or saved on disk or cassette as a new file.
- A full statistical analysis of data may be done and sent to the printer.
- Student test scores may be weighted.

REQURES 32K EXT. BASIC
TAPE $39.95 DISK $42.95

PRE-ALGEBRA I INTEGERS

INTEGERS is a series of four programs designed to give students practice in working with addition, subtraction, multiplication, division and the comparison of integers. It has many features that make a very valuable tool for introducing and/or maintaining skills:

- Up to 4 students may use the program at the same time.
- There are 9, user modifiable, skill levels.
- Students are given two opportunities to answer a problem.
- A detailed report of student performance, including number correct on first try, number wrong, total time used and percentage score, is presented at the end of a series of problems.
- The programs will run on a 16K TRS-80 Color Computer with or without disk drive.

Four distinct problem formats are presented. The first presents problems in this format: −12 + −9 = ?. The second program presents a problem with missing numerals in this format: −7 −? = 18. The third program presents a problem with a missing sign: 8 − ?6 = 14. The last program asks the student to determine the relationship (=, or) between two statments 3 −9 (??) −4 −5.

TAPE $29.95 DISK $32.95

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Cooking With CoCo

PART III

Having built the utensils, we now start on the recipe to enhance CoCo's Disk Operating System.

By Colin J. Stearman

Editor's Note:

Due to the considerable interest in this article from users of the new Disk BASIC *1.1, Colin Stearman has done some more "cooking" and has come up with the patch addresses needed. You will find this month's listing indicates the lines which are unique to each revision. The actual assembly shown is for version 1.0, so if you have 1.1 your assembly will look a little different. Next month, the author will explain the differences for you 1.1 owners. (This month's* RAINBOW ON TAPE *has the patch programs for both 1.0 and 1.1.)*

Also, the patched "DIR" command as it stands at the end of this month's revision will give some "garbage" on the screen. This is normal and the real file creation date will appear after Part 5 of this series.

We are now at the point where we can start in earnest modifying CoCo's disk operating system (DOS). We have the capability of saving to disk and reloading a modified DOS (on a 64K CoCo) and we can also save it in an EPROM. Starting this month and for the remainder of this series, I will be presenting an assembly language program to modify or "patch" the DOS to add the desired features described earlier.

The Ground Rules

Before I start on this month's details I think we had better discuss the rules for building each layer of the assembly language "cake." This may be a little tedious but if we all understand the approach now, it'll stop problems from cropping up later.

At the end of the series you will have a complete patch program called *DOSPATCH* which will add all the commands and functions. This program generates a binary file which overlays Disk BASIC, modifying what is already there and adding new code. This month we will develop the foundation of this program and each month add a new section until it is complete. Each month you will be able to assemble the composition so far and use it to patch the DOS to check

---

(Colin J. Stearman is an electronics engineer educated in the U.K. He has worked with all kinds of computers and has been a CoCo enthusiast for over two years.)

the functions implemented.

However, it is inevitable that each month we will add some code which is not fully functional because it requires code not destined to be added until a future installment. When this happens we will use a technique called "commenting out," which makes a "comment" of the line of code which cannot yet be made functional. Then later, when the required code is there, we can remove the comment and reassemble to fully activate the feature. In assembly language an asterisk at the start of the line signifies a comment line and the assembler simply ignores the entire line, no matter what its contents.

As you look through Listing 1 you will see lines marked with a reference number in square brackets (for example, [REF 12]). Later in the series we will make some modification to the associated line (most likely remove the asterisk) and I will refer to it by the reference number.

So the best approach is to use your editor to enter the listing exactly as shown. Then each month add the new listing to it, modify the reference lines as described in the text of the article, and reassemble.

The Parallel Port

A final "housekeeping" note before we begin. In a later installment I will be describing a "Centronics" parallel printer port. This month's code contains lines for this purpose. My assembler (*MACRO* by Computerware) allows conditional assembly. This simply means that I can control which lines get assembled and which do not. I use this feature to control the assembly of all the code associated with the parallel port. You will notice a section of code bounded by the following assembler directive lines:

```
IFDF PARPRT
        .
        .
(lines of code)
        .
        .
ENDC
```

This simply means that if a label called *PARPRT* has been defined, then assemble all the bounded lines; otherwise, do not. At the very beginning of the listing the variable *PARPRT* is equated to one, thus defining it and causing the lines to be assembled. If this line were "commented out," the label would not be defined and the lines would not be assembled. If your assembler does not have this feature and you will be building the parallel port, type in the bounded lines of code and leave out the "IFDF" and "ENDC" lines. If you do not intend building it, leave the whole lot out.

Enough of all this mundane detail and on to the assembly language program.

A Strong Foundation

Listing 1 is the base we will build on over the months. It consists of these primary parts:

1) Equates to memory locations and BASIC routines
2) Overlay lines to "hook in" the new code
3) Revisions to existing commands
4) New commands and functions look-up table
5) Installation code for the new commands
6) Parallel port initialization
7) Automatic file startup
8) Dummy commands and functions

Overlays

By using the *ORG* (origin) statement in this section of the code I have patched in various jumps and subroutine calls right into the existing DOS code. This is one of the main techniques for modifying existing commands. The call jumps to our new code and this usually completes the operation replaced by the jump code, then performs the revisions and returns to the original code.

You will also notice two small patches to *DSKI$* and *DSKO$*. These allow a track value up to 40 instead of 35, for use with the revised functions below.

Revisions to Existing Commands

I am sure you have encountered the "bug" in the *PCLEAR* command when used in a program. Maybe you have not come across a similar one in the *FILES* command. Each stem from the same type of error. Both commands have to relocate the BASIC program in memory but they forget to update the parse pointer so that BASIC can continue interpreting your program. The parse pointer points to the next item in your program to be interpreted by BASIC.

The revised code for these functions partly replaces the original code, duplicating much of it. At the crucial point the new pointer is calculated and stored at $A6. Then the old code is used to complete the command. As an added bonus, the revisions to *PCLEAR* allow values of up to 16 instead of the customary eight. No changes have been made to the operation of *FILES* command.

OPEN

The five lines at the label *FILDAT* complete what was happening before the jump and then add the value in the *DATE$* variable to the directory entry. This results in a creation date being stored in the directory every time a new file is created. The date is stored in the first two bytes of the directory entry reserved for future use by Radio Shack. These are bytes 16 and 17, counting from zero. The date is compressed into two bytes by a particular coding method as follows:

```
! FIRST BYTE ! SECOND BYTE !
0 1 2 3 4 5 6 7 0 1 2 3 4 5 6 7
!<---YEAR---->!<MONTH>!<--DAY-->!
```

The year value is stored as the last two digits only. Besides the obvious advantage of saving storage space, this compression technique allows the resulting 16-bit word to be sorted correctly, if this is desired.

When the directory command revisions are complete, the directory will show the creation date along with the usual information. It is very useful to know when a file was created, especially if you have the same file on another disk. Which is the most recent? This modification will tell you.

DIR

There are two revisions to this command. First, the creation date of each file is now displayed and second, the listing pauses after each screen is full, giving time to read it.

The date is displayed as *MM/DD/YY* as part of the directory line. At this time the date will not be displayed correctly because of a missing subroutine called *DATOUT*. The call to it has been commented out in line [REF 5].

When the screen is full the display will halt and wait for any key press. All keys will continue the display, except

BREAK, which will terminate the command immediately. The pause will only occur if the output is to the screen. The new *LDIR* command (described in a future installment) uses the *DIR* command but redirects it to the printer. As a result, no pause occurs.

DSKINI

Many of you have disk drives capable of accessing 40 tracks. Even the 35-track Radio Shack drives can usually access 37 tracks. Although the DOS cannot use the tracks above 35, BASIC could make use of them via the *DSKI$* and *DSKO$* commands (suitably modified, of course).

However, to do this, the extra tracks must be formatted and thus the revisions to *DSKINI*. The syntax of the command is now:

DSKINI drive, number of tracks, skip factor

"Drive" is the drive number as usual. "Number of tracks" is any value from 35 to 40. If no value is given, 35 is assumed. "Skip factor" is as described in the DOS manual. If omitted, a skip factor of four is used. Because of the slight revision to this command, if you specify a skip factor you must also specify the number of tracks.

Some acceptable calls include:

DSKINI1 — A normal initialization
DSKINI0,37 — Initialize 37 tracks with skip = 4
DSKINI3,40,2 — Initialize 40 tracks with skip = 2

BACKUP

Similarly, the *BACKUP* command has been modified to include any of the additional tracks from 36 to 40. The new syntax is:

BACKUP source drive [TO destination drive],[tracks]

Therefore, acceptable commands include:

BACKUP0 — backup to a second disk in 0, 35 tracks
BACKUP0,40 — ditto, but all 40 tracks
BACKUP1TO0,37 — backup disk in 1 to disk in 0, 37 tracks

The only requirement for backing up more than 35 tracks is that both disks be previously initialized for at least the number of tracks specified in the command.

KILL

The final command revision is to the file *KILL* command. If this is issued as a direct command then CoCo will check that you are sure you wish to erase it. An uppercase 'Y' is the only response which will result in the file being deleted. All others will cancel the kill. If the disk should have a write protect tab on it, this command will indicate the file was deleted and then return a "Write Protected" error (?WP). The file will still be there.

If the *KILL* command is used from within a BASIC program then no verification is performed. The assumption is that you have thoroughly debugged your program first!

New Commands and Functions

Next comes the command table and its dispatch address table. You will find all the new commands here. These tables are in standard BASIC format with the last character of each command having bit seven set to indicate its end. It is important that the order of the command words and the dispatch table be the same, otherwise you will issue one command and get another! The first command *(COLD)* is tokenized as $E1 with the remainder sequentially from there. The *PARALLEL* command is last because some of you will not need it and this keeps the tokens for all other commands consistent.

Immediately following the command tables are those for the new functions. These start at $A8 and when tokenized are preceded by $FF.

Because all the new functions and commands are established here but the code has not yet been implemented, I have put dummy calls at the end of the listing for each. As a result, BASIC will accept the new words but do nothing. This way you can check the operation of the tables and installing code. When each function is added, these dummy calls will be deleted.

Installation Code

The section of code starting at the label *ADDCOM* is run whenever the CoCo does a cold start (described in a future installment). This code sets up a table in low memory which is used to search for each BASIC command and function as the interpreter encounters them. Microsoft (who wrote this BASIC) kindly set things up so one more table can be added above and beyond the Disk BASIC commands.

At the end of this section is a revision to the "hook" in memory which gets taken when an error is encountered. For now this revision has been "commented out," but later it will allow us to both trap errors and prevent BASIC from halting program execution and also return more meaningful error messages.

Parallel Port Initialization

Continuing the code, which is executed during a cold start, we encounter the parallel port "hook" patch and the initialization routine for the new peripheral interface adapter (PIA) which will run it. If you are not going to use the parallel port, leave this entire section out.

Auto File Execution

Just prior to this, I have put a small reminder indicating who brought you these useful revisions. Then comes a feature which is more powerful than you might at first imagine.

Before completing start-up and giving you the OK prompt, the revised BASIC tries to find and run a BASIC file called *AUTOEXEC.BAS* on drive 0. If successful, this program is automatically run. If a disk is present but with no such file on it, then an NF Error is returned. If no disk is in the drive then an I/O Error results.

The power of this feature lies in the fact that you write the *AUTOEXEC.BAS* file and you can put in it anything you want. For example, it could simply be line calling for the running of some other program on the disk. Or perhaps an automatic backup scheme. Listing 2 is designed to request the date and store it in the new memory location for this purpose. I suggest that at the very least you have such a file on your disks.

The power up sequence I have used successfully is:

1) Power up the video monitor
2) Power the Multi-Pak Interface, if you have one

3) Then switch on each disk drive
4) Load the disk with the *AUTOEXEC.BAS* file in drive 0
5) Power up CoCo

I have used this hundreds of times with no problem. After a few seconds the banner will display and drive 0 will turn on. If the file exists it will automatically run.

Now you can get your favorite program running without even touching the keyboard!

The Final Odds and Ends

The code at *COMCOD* and *FUNCOD* is executed during BASIC interpretation to get the address of the code needed to execute the command or function. Then immediately following you will see the dummy calls mentioned earlier.

Testing The Program

64K COMPUTER OWNERS

Testing is very easy for these people. If you did as I suggested last month, you should have a bootable disk with unmodified disk BASIC on it. If so, load it and start.

Once you have BASIC running in the all RAM mode, the procedure is to disable the interrupts, then overlay the patch file and cold start the new BASIC. As all interrupts are generated through one of the PIAs, they can be simply disabled by disabling the PIA. The steps are as follows, once the all RAM BASIC is running.

```
1) POKE &HFF03,&H34:'stop interrupts
2) LOADM"DOSPATCH":POKE&H71,0:
   EXEC&HA027
```

These two lines should be entered as direct commands to BASIC. When complete, a new start-up banner with the revisions copyright notice should be displayed. You should now be able to test all the revised commands implemented so far. Also, all the new commands and functions should be acceptable to BASIC (no SN Error), but of course, they will do nothing.

You could save the revised DOS back to disk, but I recommend you save this until all revisions are completed.

NON-64K COMPUTER OWNERS

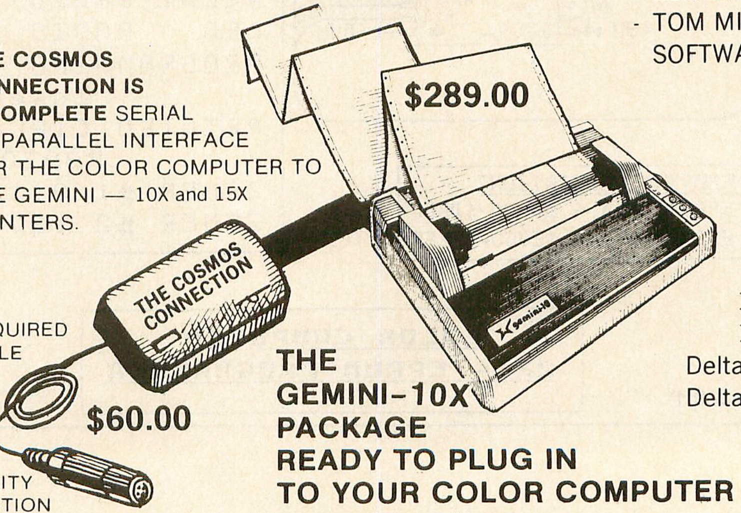
For you the testing is a little more difficult. We really do not want to go replacing the DOS ROM (Read only memory) in the disk controller cartridge quite yet. We can however, put the revised code in an EPROM and load it into the socket on the EPROM programmer addressed at $C000.

If you have the Multi-Pak Interface you can fully test the result; if not, then basic functionality can be tested by plugging the EPROM programmer with programmed EPROM inserted into the expansion socket and then trying the commands. Of course, those accessing the disk drives will not work because the controller is not plugged in.

Without the Multi-Pak

From last month, you should already have Disk BASIC saved on tape under filename *DBASIC*. With the disk system operational, do this:

```
CLEAR 200,&H3FFF
```



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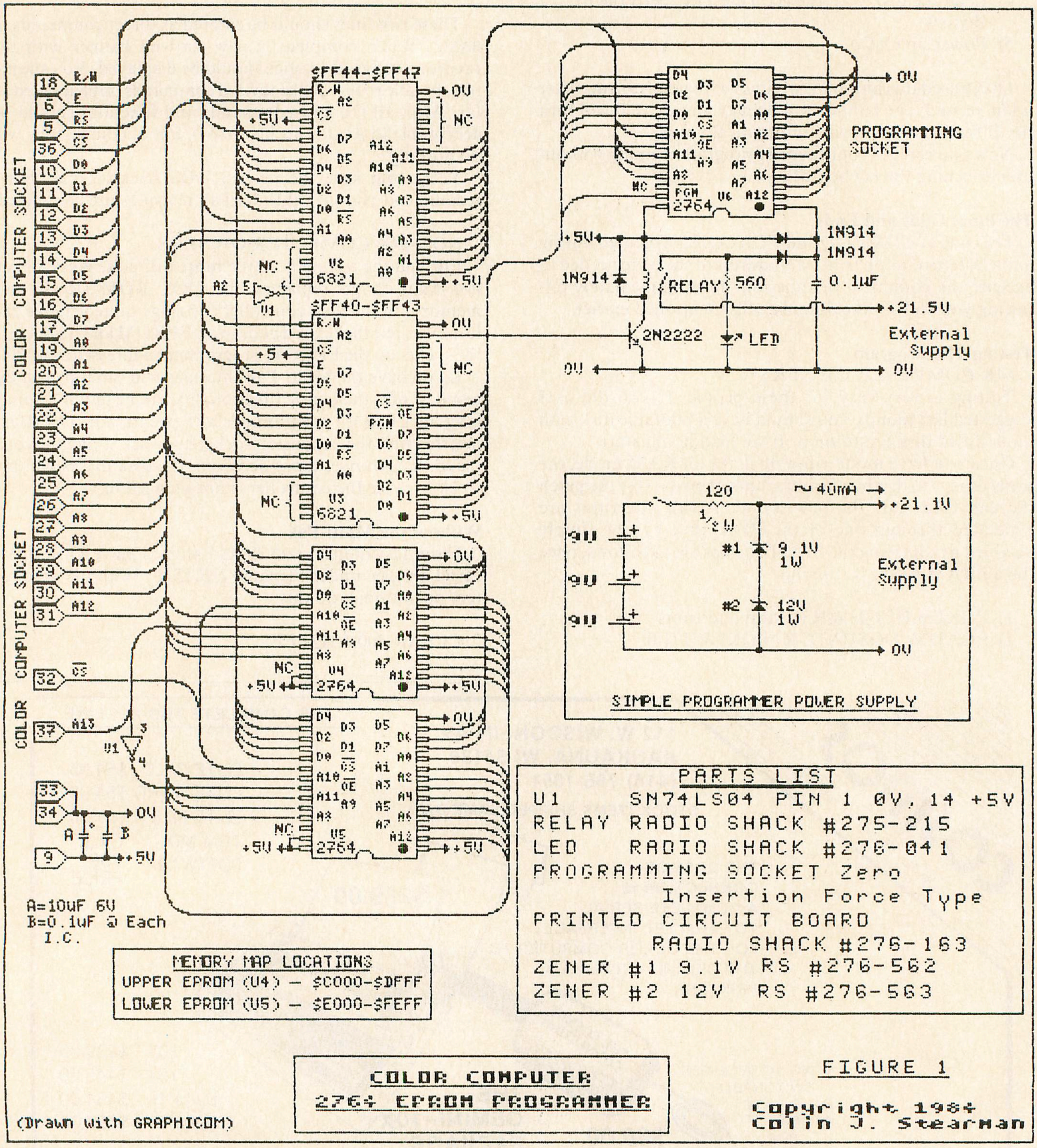
$FF44-$FF47
$FF40-$FF43
COLOR COMPUTER SOCKET
18 R/W
6 E
5 RS
36 CS
10 D0
11 D1
12 D2
13 D3
14 D4
15 D5
16 D6
17 D7
19 A0
20 A1
21 A2
22 A3
23 A4
24 A5
25 A6
26 A7
27 A8
28 A9
29 A10
30 A11
31 A12
32 CS
37 A13
33
34
9
0V
+5V
NC
U1
U2 6821
U3 6821
U4 2764
U5 2764
U6 2764
PGM
PROGRAMMING SOCKET
1N914
1N914
1N914
RELAY
560
0.1uF
+21.5V
External Supply
2N2222
LED
120
~40mA
+21.1V
1/2 W
9V
9V
9V
#1 9.1V 1W
#2 12V 1W
External Supply
SIMPLE PROGRAMMER POWER SUPPLY
A=10uF 6V
B=0.1uF @ Each I.C.

PARTS LIST

U1 SN74LS04 PIN 1 0V, 14 +5V
RELAY RADIO SHACK #275-215
LED RADIO SHACK #276-041
PROGRAMMING SOCKET Zero Insertion Force Type
PRINTED CIRCUIT BOARD RADIO SHACK #276-163
ZENER #1 9.1V RS #276-562
ZENER #2 12V RS #276-563

MEMORY MAP LOCATIONS

UPPER EPROM (U4) — $C000-$DFFF
LOWER EPROM (U5) — $E000-$FEFF

COLOR COMPUTER
2764 EPROM PROGRAMMER

(Drawn with GRAPHICOM)

FIGURE 1

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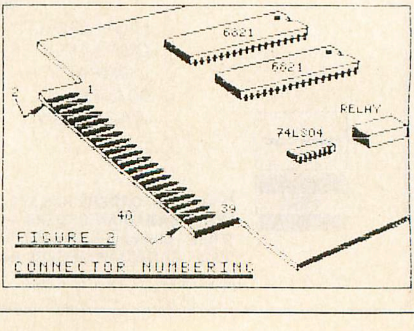
6821
6821
RELAY
74LS04
2
1
40
39

FIGURE 2
CONNECTOR NUMBERING

Editor's Note:
Because of an error in production, two figures were left out of the last installment of "Cooking With CoCo." Here they are.

```
CLOADM"DBASIC",&H4000-&HC000+65536
LOADM"DOSPATCH",&H4000-&HC000+65536
CSAVEM"DBASIC#1",&H4000,&H5FFF,&HA027
```

Then power down, plug in the EPROM programmer, and do this:

```
CLEAR 200,&H3FFF
CLOADM"DBASIC#1"
CLOADM"EPROM"
EXEC
```

Then transfer the memory contents from $4000 to $5FFF to a completely erased EPROM.

With Multi-Pak

Program the EPROM following the steps given last month under the subtitle "Using the Programmer with the Disk," but just before doing the *EXEC*, enter:

```
LOADM"DOSPATCH",&H4000-&HC000+65536
```

To test, use the procedure in the same section. But after doing the *POKE65407,3* also enter *POKE&H71,0* and *EXEC&HA027*. This will cold start the new system and allow you to see the automatic file execution feature.

Next Month

We will fill in some of the code for those commands and functions we just added. Also we will add *FLEXIKEY*. This is a keyboard utility which is so useful (even though I say it myself!) that you'll wonder how you ever survived without it!

Finally, if you would like the entire *DOSPATCH* program source (with all future installments), along with binary files with and without the parallel port driver, just send me a disk (no cassettes please) along with $6 and a stamped, addressed disk mailer. I will load the disk and return it to you promptly.

Address this request or any questions to Colin Stearman, 143 Ash Street, Hopkinton, MA 01748.

Looking forward to your company next month.

Listing 1:

```
DOSPATCH - PATCH0001         OPT   LLGMPUTERWARE MACRO ASSEMBLER  PAGE 1
Patch to RSDOS P0002************************rt 3. (C)1984 C.J.STEARMAN
0000            0003 REV     EQU   0
                0004 * Set REV = 0 for DOS 1.0, =1 for DOS 1.1
                0005 *********************************************
                0006 *        RADIO SHACK COLOR COMPUTER DOS      *
                0007 *        IMPROVEMENTS AND MODIFICATIONS      *
                0008 *                                            *
                0009 *         (C)1984 COLIN J. STEARMAN          *
                0010 *********************************************
                0011 *  Patch #1
                0012         OPT   NOG
                0013 ********************
                0014 * COMMENT OUT THE NEXT LINE FOR A SERIAL PORT VERSION
                0015 *(Controls conditional assembly)
0001            0016 PARPRT EQU   1
                0017 ********************
                0018 ****DOS 1.0 PATCH ADDRESSES*******
0000            0019         IFEQ  REV
C028            0020 A001   EQU   $C028
C0D1            0021 A0001  EQU   $C0D1
C108            0022 A0002  EQU   $C108
```

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```
C118            0023 A0003  EQU   $C118
C124            0024 A0004  EQU   $C124
C17D            0025 A0005  EQU   $C17D
C570            0026 A0006  EQU   $C570
C575            0027 A0007  EQU   $C575
C58F            0028 A0008  EQU   $C58F
C65F            0029 A0009  EQU   $C65F
C6B8            0030 A0010  EQU   $C6B8
C6CB            0031 A0011  EQU   $C6CB
C6CF            0032 A0012  EQU   $C6CF
C990            0033 A0013  EQU   $C990
CA3B            0034 A0014  EQU   $CA3B
CB4A            0035 A0015  EQU   $CB4A
CBCF            0036 A0016  EQU   $CBCF
CBD5            0037 A0017  EQU   $CBD5
CC26            0038 A0018  EQU   $CC26
CC41            0039 A0019  EQU   $CC41
CC44            0040 A00195 EQU   $CC44
CE2E            0041 A0020  EQU   $CE2E
CEE5            0042 A0021  EQU   $CEE5
D169            0043 A0022  EQU   $D169
D182            0044 A0023  EQU   $D182
D18E            0045 A0024  EQU   $D18E
D1AF            0046 A0025  EQU   $D1AF
D1E5            0047 A0026  EQU   $D1E5
D446            0048 A0027  EQU   $D446
D4AB            0049 A0028  EQU   $D4AB
D4B2            0050 A0029  EQU   $D4B2
D571            0051 A0030  EQU   $D571
D594            0052 A0031  EQU   $D594
D670            0053 A0032  EQU   $D670
D6CD            0054 A0033  EQU   $D6CD
D723            0055 A0034  EQU   $D723
D7DD            0056 A0035  EQU   $D7DD
00E0            0057 HITOKN EQU   $E0
                0058 *  Highest command token in DOS 1.0
                0059        ENDC
                0060 **************
                0061 ****DOS 1.1 PATCH ADDRESSES******
                0062        IFGT  REV
                0063 A001   EQU   $C02C
                0064 A0001  EQU   $C0E4
                0065 A0002  EQU   $C11B
                0066 A0003  EQU   $C12B
                0067 A0004  EQU   $C137
```

```
                0068 A0005  EQU   $C190
                0069 A0006  EQU   $C59D
                0070 A0007  EQU   $C5A2
                0071 A0008  EQU   $C5BC
                0072 A0009  EQU   $C68C
                0073 A0010  EQU   $C6E5
                0074 A0011  EQU   $C6F8
                0075 A0012  EQU   $C6FC
                0076 A0013  EQU   $CA3E
                0077 A0014  EQU   $CAE9
                0078 A0015  EQU   $CC1C
                0079 A0016  EQU   $CCA9
                0080 A0017  EQU   $CCAF
                0081 A0018  EQU   $CD00
                0082 A0019  EQU   $CD1B
                0083 A00195 EQU   $CD1E
                0084 A0020  EQU   $CF0A
                0085 A0021  EQU   $CFC1
                0086 A0022  EQU   $D256
                0087 A0023  EQU   $D26F
                0088 A0024  EQU   $D27B
                0089 A0025  EQU   $D29C
                0090 A0026  EQU   $D2D2
                0091 A0027  EQU   $D534
                0092 A0028  EQU   $D599
                0093 A0029  EQU   $D5A0
                0094 A0030  EQU   $D65E
                0095 A0031  EQU   $D681
                0096 A0032  EQU   $D761
                0097 A0033  EQU   $D7C0
                0098 A0034  EQU   $D816
                0099 A0035  EQU   $D8D0
                0100 HITOKN EQU   $E1
                0101 *   Highest command token in DOS 1.1
                0102        ENDC
                0103 ******************
                0104 *
C58F            0105 CHRVCT EQU   A0008      OLD VECTOR JUMP
0080            0106 NTRACK EQU   $80        USE CASSETTE TEMP STORE
                0107 *********************
                0108 * USES UNUSED(?) LOW RAM LOCATIONS
0076            0109 ELINE  EQU   $76        LINE # CAUSING ERROR
00DC            0110 JLINE  EQU   $DC        LINE TO JUMP TO ON ERROR
005A            0111 ECODE  EQU   $5A        ERROR CODE
                0112 *********************
008A            0113 ZERO   EQU   $8A        ZERO CONSTANT 16 BITS
FF26            0114 DATA   EQU   $FF26      PIA DATA REGISTER
A1B1            0115 GETKEY EQU   $A1B1      BASIC'S CURSOR/KEY ROUTINE
B958            0116 RETURN EQU   $B958      OUTPUTS A CARRIAGE RETURN
CC41            0117 SPACE  EQU   A0019      OUTPUT A SPACE
A282            0118 CHROUT EQU   $A282      OUTPUTS CHARACTER IN A
B9A2            0119 STROUT EQU   $B9A2      BASICS STRING OUTPUT X POINTS
                0120 *                    TO STRING, B HAS CHAR COUNT
006F            0121 DEVNUM EQU   $6F        OUTPUT DEVICE NUMBER
01DA            0122 HLDBFR EQU   $1DA       CASSETTE BUFFER FOR HOLD
02DD            0123 BASBFR EQU   $2DD       BASIC BUFFER
01D7            0124 HLDPTR EQU   $1D7       IN CASSETTE FILE NAME BFR
01D8            0125 INSERT EQU   $1D8       DITTO
01D9            0126 WHLINE EQU   $1D9       DITTO
0095            0127 BDFLAG EQU   $95        BAUD RATE LOCATION USED AS
                0128 *                    SERIAL/PARALLEL FLAG
0096            0129 BAUDRT EQU   $96        NORMAL SERIAL BAUD RATE LSB
                0130 * NEXT 3 WORDS ARE IN CASSETTE FILE NAME
01D1            0131 LINNUM EQU   $1D1       AUTO CURRENT LINE NUMBER
01D3            0132 INCNUM EQU   $1D3       AUTO LINE INCREMENT
01D5            0133 LCOUNT EQU   $1D5       USED IN DIR DELAY
                0134 * there are 4 empty ram locations in the command
                0135 *dispatch table terminator. they are $149/4A and
                0136 *  $14E/F.
0149            0137 AUTOFG EQU   $149
014A            0138 INTFLG EQU   $14A       RAM FLAG FOR REISSUED LINE
014E            0139 DATUM  EQU   $14E       USES TWO BYTES TO STORE DATE
                0140 *
                0141 * This section contains the overlays to patch in
                0142 * the new commands, functions and revisions
                0143 *
                0144 * REMOVE <CR> AFTER BANNER
C17D            0145        ORG   A0005
C17D 00         0146        FCB   0
                0147 *
                0148 **** PCLEAR PATCH ****
C028            0149        ORG   A001       SETS TABLE TO A0020 ORIGINALLY
C028 CCD7DD     0150        LDD   #PCLEAR    REPOINT TO NEW ROUTINE
                0151 *
0000            0152        IFEQ  REV        DOS 1.0
                0153 **** FILES PATCH ****
D0E4            0154        ORG   $D0E4      PATCH OVER EXISTING CODE
D0E4 7EDB24     0155        JMP   FILES      DO EXTRA CODE
                0156        ENDC
                0157 *
                0158 *** PATCH FOR NEW KEYBOARD ROUTINE ****
```

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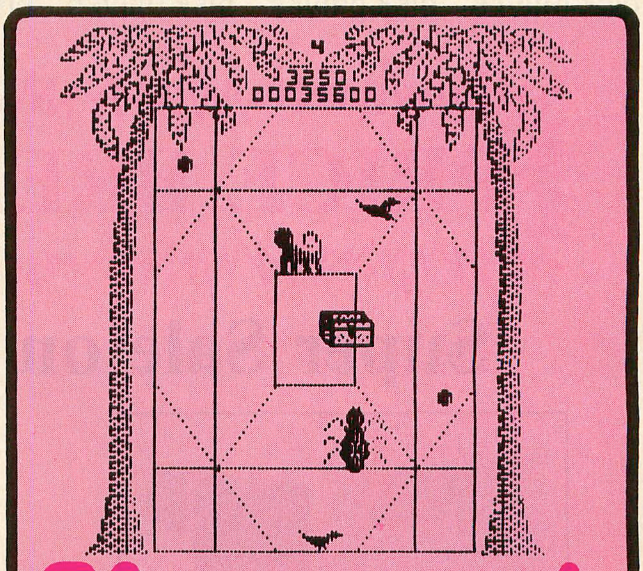
```
C108           0159        ORG   A0002       SETUP FOR JMP AT $16A
               0160 *        FDB KEYBRD GOES TO NEW KEYBOARD RTN [REF 1]
               0161 *  [REF 1: Uncomment when FLEXIKEY code is installed]
               0162 * DID HAVE A000B, JUMP TO THIS IF DEV CODE<>0
               0163 *
               0164 **** ADD COMMANDS PATCH ****
C0D1           0165        ORG   A0001
C0D1 7ED991    0166        JMP   ADDCOM
               0167 *
C124           0168        ORG   A0004
               0169 *   FDB ERCNCL          [REF 2]
               0170 * [REF 2: Uncomment when ERRORS code is installed]
               0171 *PATCH INTO RUN COMMAND TO CANCEL ERROR JUMP
               0172 *A0004 ORIGINALLY HAD A0013
               0173 *******
               0174 *PATCH IN FOR AUTO INPUT
C118           0175        ORG   A0003
               0176 *   FDB INPUT           [REF 3]
               0177 * [REF 3: Uncomment when AUTO code is installed]
               0178 *A0003 DID HAVE $C6B7 WHICH JUST RETURNED
               0179 ************************
               0180 ** DO A PAUSE AFTER EACH 15 LINES IN DIR
CBD5           0181        ORG   A0017
               0182 * INITIALIZE COUNTER
CBD5 BDD886    0183        JSR   NOTBRK
               0184 *
CC26           0185        ORG   A0018
               0186 * DO PAUSE IN DIR
CC26 BDD849    0187        JSR   LINHLD
               0188 *
               0189 *
               0190 **********************************
               0191 * PATCH TO ADD DATE TO FILE WHEN OPENING
C570           0192        ORG   A0006
C570 7ED83C    0193        JMP   FILDAT      PUT DATE INTO FILE
               0194 *******
               0195 * PATCH FOR DSKINI EXTRA TRACKS
               0196 **********************************
D571           0197        ORG   A0030
D571 9180      0198        CMPA  <NTRACK
               0199 *
D594           0200        ORG   A0031
D594 9180      0201        CMPA  <NTRACK
               0202 *
D446           0203        ORG   A0027
               0204 * FIX DSKI$/DSKO$ TO ALLOW UP TO 40 TRACKS
D446 27        0205        FCB   39          TOP TRACK NUMBER
               0206 *
D4AB           0207        ORG   A0028       FIRST LINE OF DSKINI
D4AB 1603DE    0208        LBRA  DSKINI      GOTO NEW CODE
               0209 * DID HAVE LBEQ $A61F
               0210 *
               0211 *PATCH BACKUP
D182           0212        ORG   A0023
D182 7ED8AC    0213        JMP   BCKPAT      BACKUP PATCH
               0214 * RETURN TO A0024
               0215 *
               0216 * THIS PATCHES BACKUP SYNTAX CHANGES
               0217 *    MAKE TRACK COUNT A VARIABLE
D1AF           0218        ORG   A0025
D1AF 9680      0219        LDA   <NTRACK     WAS LDA #23
               0220 *
               0221 * THIS PATCHES KILL TO CHECK FOR ERASING FILE
C6CB           0222        ORG   A0011
C6CB 7ED8D4    0223        JMP   KILLCK      DO KILL CHECK CODE
               0224 *
               0225 *****Following patches set the drive step rate
               0226 *Affects all drives, select rate of slowest drive
               0227 *
D6CD           0228        ORG   A0033       RESTORE step rate
D6CD 02        0229        FCB   2           =20mS;3=30mS;1=12mS;0=6mS
               0230
D723           0231        ORG   A0034       SEEK step rate
D723 16        0232        FCB   $16         =20mS;$17=30mS;$15=12mS;$14=6mS
               0233 ********************************************
               0234 * Patch code to existing commands
               0235 *
               0236 * ALL NEW CODE RESIDES IN THE UPPER
               0237 * AREA OF DISK ROM NOT USED
               0238 * BY DISK BASIC, STARTING AT
               0239 * A0035.
D7DD           0240        ORG   A0035
               0241 *
               0242 *
               0243 *************************
               0244 * PATCH FIXES THE BUG IN PCLEAR
               0245 *
               0246 *
               0247 *
               0248 * DO ROUTINE, FIX IS TO REVISE PARSER POINTER
               0249 * AT $A6 FOR CHANGE IN LOCATION
```



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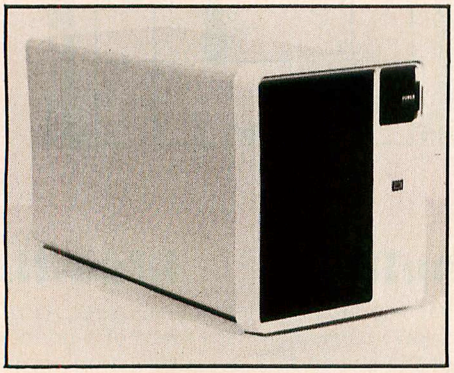

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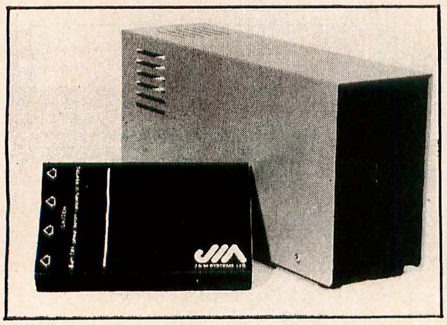

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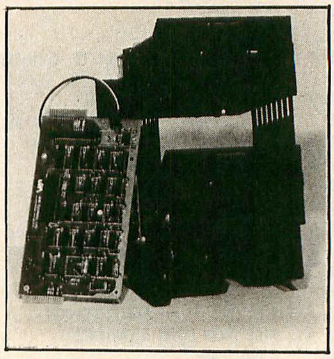

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```
                     * OF BASIC
                     *
D7DD 81C0            PCLEAR CMPA  #$C0      IS IT PCLEAR?
D7DF 1026F64B               LBNE  A0020     NO, EXIT TO PREVIOUS HOOK
D7E3 9D9F                   JSR   $9F       PARSE OVER PCLEAR TOKEN
D7E5 BDB70B                 JSR   $B70B     GET & EVAL. 1ST ARG.
D7E8 5D                     TSTB            IS IT ZERO?
D7E9 274E                   BEQ   FCERR     YES, SO ERROR
D7EB C111                   CMPB  #17       IT IS >16?
D7ED 244A                   BHS   FCERR     YES, ERROR
D7EF 8606                   LDA   #6        MULTIPLY BY 1536(1 SCREEN)
D7F1 3D                     MUL              6*256=1536
D7F2 DBBC                   ADDB  $BC       ADD TO START OF
D7F4 1F98                   TFR   B,A       1SRT GRAPHIC SCREEN
D7F6 C601                   LDB   #1
D7F8 1F02                   TFR   D,Y       COPY THIS+1 TO Y
D7FA 1093B7                 CMPD  $B7       IS THIS PAGE RESERVED?
D7FD 253A                   BLO   FCERR     YES, SO ERROR
D7FF 9319                   SUBD  $19       SUB. START OF BASIC
D801 1F03                   TFR   D,U       SAVE VALUE TEMPORARILY
D803 D31B                   ADDD  $1B       ADD END OF BASIC
D805 1F01                   TFR   D,X       SAVE NEW END ADDRESS
D807 C300C8                 ADDD  #200      STACK SIZE
D80A 9321                   SUBD  $21       STACK TOP ADDRESS
D80C 242B                   BHS   FCERR     NO ROOM, ERROR
D80E 8D0B                   BSR   DIRECT    CHECK IF DIRECT
D810 2706                   BEQ   L1        YES SO DIRECT NO FIX
D812 1F30                   TFR   U,D       RECOVER OFFSET
D814 D3A6                   ADDD  $A6       REVISE PARSER POINTER
D816 DDA6                   STD   $A6       AND SAVE IT
D818 7E96B4          L1     JMP   $96B4     CONTINUE PCLEAR ROUTINE
                     *
                     *THIS CHECKS IF IN DIRECT MODE, Z=1 IF SO
D81B 3410            DIRECT PSHS  X         PRESERVE A AND B
D81D 9E68                   LDX   $68       GET LINE NUMBER
D81F 3001                   LEAX  1,X       IS IT $FFFF?
D821 3510                   PULS  X         RECOVER D
D823 39                     RTS
                     **************************
0000                        IFEQ  REV       DOS 1.0
                     *  PATCH FIXES A SIMILAR BUG
                     *  IN THE FILES COMMAND
D824 931B            FILES  SUBD  <$1B      END OF BASIC ADDRESS
                     * D HAS OFFSET DUE TO MOVE OF BASIC
D826 3406                   PSHS  A,B       SAVE RESULTS
D828 8DF1                   BSR   DIRECT    CHECK IF DIRECT MODE
D82A 2706                   BEQ   SKIP      YES SO DIRECT COMMAND
D82C ECE4                   LDD   ,S        GET D OFF STACK FIX OFFSET
D82E D3A6                   ADDD  $A6       ADD TO PARSER POINTER
D830 DDA6                   STD   $A6       SAVE IT
D832 3506            SKIP   PULS  A,B       RECOVER OFFSET
D834 D319                   ADDD  <$19      ADD BASIC START ADDRESS
D836 7ED0E8                 JMP   $D0E8     CONTINUE FILES CODE
                            ENDC
                     *
D839 7EB44A          FCERR  JMP   $B44A     ?FC ERROR
                     *
                     **************************
                     *FILE DATE TO DIRECTORY
D83C B70976          FILDAT STA   $976      FINISH WHAT WAS DOING
D83F A742                   STA   2,U       DITTO
D841 FC014E                 LDD   DATUM     GET DATE
D844 ED45                   STD   5,U       PUT INTO BUFFER
D846 7EC575                 JMP   A0007     CONTINUE OPENING FILE
                     **************************
                     * DIR command revisions
                     *
                     *
                     ******************************************
                     * directory output of file creation date
D849 3404            LINHLD PSHS  B         SAVE GRANULE COUNT
D84B BDBDCC                 JSR   $BDCC     OUTPUT IT TO SCREEN
D84E BDCC41                 JSR   SPACE     OUTPUT 1 SPACE
D851 3504                   PULS  B         RECOVER GRANULE COUNT
D853 C109                   CMPB  #9        HOW MANY DIGITS?
D855 2203                   BHI   ATCLM     DONT NEED EXTRA SPACE
D857 BDCC41                 JSR   SPACE     OUTPUT A SPACE
D85A AE62            ATCLM  LDX   2,S       GET DIRECTORY PNTR
D85C EC8810                 LDD   16,X      GET DATE FROM DIRECTORY
D85F 3406                   PSHS  D         SAVE VALUE
D861 C608                   LDB   #8        SEE IF ROOM FOR STRING
D863 BDB50F                 JSR   $B50F     WONT RETURN IF NOT
                     *X POINTS TO STRING SPACE
D866 3506                   PULS  D         GET DATE AGAIN
                     *        JSR DATOUT PUT DATE IN IT  [REF 5]
D868 C6F8                   LDB   #-8       CHARACTERS TO FIX
D86A A685            OUTCHR LDA   B,X       GET CHARACTER
D86C BDA282                 JSR   CHROUT    OUTPUT IT
D86F 5C                     INCB            REDUCE COUNTER
D870 26F8                   BNE   OUTCHR    DO SOME MORE
                     ********************************
                     * DIRECTORY PAUSE TO SCREEN ONLY
                     *
D872 0D6F                   TST   DEVNUM    CHECK IF TO SCREEN
D874 2615                   BNE   CR        DON'T PAUSE IF DIR NOT TO SCREEN
D876 7A01D5                 DEC   LCOUNT    DECREASE CURRENT LINE COUNT
D879 2610                   BNE   CR        OUTPUT NEXT LINE
D87B BDA1B1          WAIT   JSR   GETKEY    GET KEYBOARD ENTRY
D87E 27FB                   BEQ   WAIT      IF NONE YET
                     *
D880 8103                   CMPA  #3        IS IT BREAK?
D882 2602                   BNE   NOTBRK    NO
D884 3264                   LEAS  4,S       REMOVE OLD RETURN
                     * AND X LEFT ON STACK
                     *
D886 C610            NOTBRK LDB   #16       REST LCOUNT
D888 F701D5                 STB   LCOUNT
D88B 39              CR     RTS
                     ********************
                     ** PATCH DSKINI$ TO FORMAT UP TO 40 TRACKS
                     ** SYNTAX IS DSKINI drive,number of tracks,skip factor
                     ** NUMBER OF TRACKS IS 35 - 40, DEFAULTS TO 35
D88C 1027CD8F        DSKINI LBEQ  $A61F     DN ERROR
D890 BDD169                 JSR   A0022     CHECK FOR 0-3 DEVICE #
D893 C623                   LDB   #35       DEFAULT # OF TRACKS
D895 9DA5                   JSR   $A5       ANY MORE ON INPUT LINE?
D897 2703                   BEQ   NOVALS    NO MORE VALUES
D899 BDB738                 JSR   $B738     GET TRACK VALUE
D89C 8D03            NOVALS BSR   TRKCHK    CHECK FOR VALID DRIVE #
                     *
D89E 7ED4B2                 JMP   A0029     RETURN TO REGULAR CODE
                     *
D8A1 C123            TRKCHK CMPB  #35       LOWEST LEGAL VALUE
D8A3 2594                   BLO   FCERR     ?FC ERROR
D8A5 C128                   CMPB  #40       HIGHEST LEGAL VALUE
D8A7 2290                   BHI   FCERR     ?FC ERROR
D8A9 D780                   STB   NTRACK    SAVE IN TEMP BUFFER
D8AB 39                     RTS
                     *
                     ************************
                     **** PATCH TO BACKUP ****
                     *
D8AC 3404            BCKPAT PSHS  B         SAVE SOURCE DRIVE NO.
D8AE C623                   LDB   #35       DEFAULT TRACKS
D8B0 D780                   STB   NTRACK    SAVE DEFAULT VALUE
D8B2 3504                   PULS  B         RECOVER SOURCE DRIVE NO.
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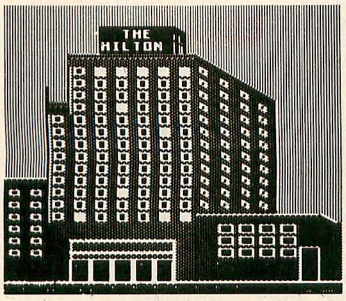

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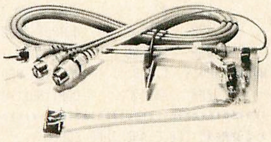

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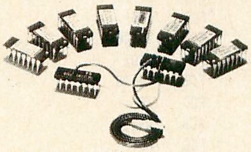

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D8B4 9DA5       0386        JSR   $A5        ANY MORE ON LINE?
D8B6 2719       0387        BEQ   BUPOUT     NO SO EXIT
D8B8 812C       0388        CMPA  #',        LOOK FOR A COMMA
D8BA 270B       0389        BEQ   GTTRK      YES SO GET NO OF TRACKS
                0390 * LOOK FOR "TO" TOKEN
D8BC C6A5       0391        LDB   #$A5       "TO" TOKEN
D8BE BDB26F     0392        JSR   $B26F      CHECK FOR IT SN ERROR IF NOT
D8C1 BDD169     0393        JSR   A0022      get second drive and check it
                0394 *  now we have second drive in b
                0395 ************************
                0396 *  NOW GET NO OF TRACKS
D8C4 3404       0397 GTTRK  PSHS  B          PRESERVE SECOND DRIVE #
D8C6 9DA5       0398        JSR   $A5        ANY MORE ON LINE?
D8C8 2705       0399        BEQ   BUPEXT     NO SO CONTINUE OLD CODE
D8CA BDB738     0400        JSR   $B738      PARSE , GET VALUE
D8CD 8DD2       0401        BSR   TRKCHK     FOR VALID DRIVE #
D8CF 3504       0402 BUPEXT PULS  B          RECOVER SECOND DRIVE VALUE
D8D1 7ED18E     0403 BUPOUT JMP   A0024      CONTINUE OLD CODE
                0404 **********************
                0405 * REVISE KILL ROUTINE TO CHECK FOR ERASURE
                0406 *
D8D4 BDC65F     0407 KILLCK JSR   A0009      CHECK FOR FILE
D8D7 BDC6B8     0408        JSR   A0010      DID WE GET A MATCH?
                0409 * WON'T RETURN HERE IF WE DIDN'T
D8DA 3416       0410        PSHS  X,A,B      SAVE REGISTERS
D8DC BDD81B     0411        JSR   DIRECT     only confirm in direct mode
D8DF 2638       0412        BNE   NOCNF      Dont confirm delete
D8E1 C60A       0413        LDB   #10        CHARACTER COUNT
D8E3 8ED8FD     0414        LDX   #CHKMSG    POINT TO MESSAGE
D8E6 BDB9A2     0415        JSR   STROUT     OUTPUT THIS
D8E9 BDA1B1     0416        JSR   GETKEY     GET ANSWER
D8EC BDA282     0417        JSR   CHROUT     OUTPUT IT
D8EF 3402       0418        PSHS  A          SAVE IT
D8F1 BDB958     0419        JSR   RETURN     OUTPUT A CR
D8F4 3502       0420        PULS  A          GET RESPONSE
D8F6 8159       0421        CMPA  #'Y        IS IT YES
D8F8 2714       0422        BEQ   CONFRM     CONFIRM DELETION
D8FA 3516       0423        PULS  X,A,B
D8FC 39         0424        RTS              EXIT AND DON'T DELETE
D8FD 53         0425 CHKMSG FCC   %SURE(Y/N)?%
D907 44         0426 CNFMSG FCC   /DELETED/
                0427 *
D90E 8ED907     0428 CONFRM LDX   #CNFMSG    POINT TO CONFIRM MESSAGE
D911 C607       0429        LDB   #7         CHARS  IN IT
D913 BDB9A2     0430        JSR   STROUT     OUTPUT THIS
D916 BDB958     0431        JSR   RETURN     PLUS A CR
D919 3516       0432 NOCNF  PULS  X,A,B      RECOVER REGS
D91B 7EC6CF     0433        JMP   A0012      CONTINUE KILL COMMAND
                0434 ****************************************
                0435 * COMMAND TABLE AND JUMP CODE
                0436 *
                0437 *
                0438 *******************************************
                0439 *  ADDED BASIC COMMANDS AND FUNCTIONS      *
                0440 *******************************************
                0441 *
                0442 *
                0443 *     COMMAND TABLE
                0444 *
D91E 43         0445 COMTBL FCC   /COL/
D921 C4         0446        FCB   'D+128
D922 57         0447        FCC   /WPOK/
D926 C5         0448        FCB   'E+128
D927 46         0449        FCC   /FAS/
D92A D4         0450        FCB   'T+128
D92B 53         0451        FCC   /SLO/
D92E D7         0452        FCB   'W+128
D92F 58         0453        FCC   /XE/
D931 D1         0454        FCB   'Q+128
D932 41         0455        FCC   /AUT/
D935 CF         0456        FCB   'O+128
D936 53         0457        FCC   /SWA/
D939 D0         0458        FCB   'P+128
D93A 45         0459        FCC   /ERROR/
D93F D3         0460        FCB   'S+128
D940 42         0461        FCC   /BAU/
D943 C4         0462        FCB   'D+128
D944 4C         0463        FCC   /LDI/
D947 D2         0464        FCB   'R+128
                0465 *
                0466        IFDF  PARPRT     ASSEMBLE FOR PARALLEL PORT
                0467 *KEEP THIS LAST IN LIST FOR TOKEN COMPATABILITY
D948 50         0468        FCC   /PARALLE/          [REF 6]
D94F CC         0469        FCB   'L+128                   [REF 7]
                0470        ENDC
                0471 * [REF 6 & 7: If no conditional assembler and
                0472 *  parallel port is used, delete IFDF and ENDC
                0473 *  lines. If not used, delete all 4 lines.]
                0474 *
                0475 *****
                0476 *    COMMAND JUMP TABLE
```

```
                 0477 * MUST BE IN SAME ORDER AS COMMANDS
                 0478 *
D950             0479 CTABLE EQU   *            TABLE START
D950 DA4E        0480 CONDSP FDB   COLD         COLD RESTART
D952 DA4F        0481        FDB   WPOKE
D954 DA50        0482        FDB   FAST
D956 DA51        0483        FDB   SLOW
D958 DA52        0484        FDB   XEQ
D95A DA53        0485        FDB   AUTO
D95C DA55        0486        FDB   SWAP
D95E DA54        0487        FDB   ERRCMD
D960 DA56        0488        FDB   BAUD
D962 DA57        0489        FDB   LDIR         PRINT DIRECTORY
                 0490 *
                 0491 *KEEP THIS LAST IN LIST FOR TOKEN COMPATABILITY
                 0492        IFDF  PARPRT       ASSEMBLE FOR PARALLEL PORT
D964 DA58        0493        FDB   PARA              [REF 8]
                 0494        ENDC
                 0495 * [REF 8: If no conditional assembler and
                 0496 *  parallel port is used, delete IFDF and ENDC
                 0497 *  lines. If not used, delete all 3 lines.]*
D966             0498 CTBLEX EQU   *            TABLE END
                 0499 *****
000B             0500 NUMCMD EQU   (CTBLEX-CTABLE)/2 NO. OF CMDS
                 0501 ******************************************
                 0502 *   FUNCTION TABLE
                 0503 *
D966 53          0504 FUNTBL FCC   /SCAN/
D96A A4          0505        FCB   '$+128
D96B 44          0506        FCC   /DATE/
D96F A4          0507        FCB   '$+128
D970 45          0508        FCC   /ELIN/
D974 C5          0509        FCB   'E+128
D975 45          0510        FCC   /ECOD/
D979 C5          0511        FCB   'E+128
0000             0512        IFEQ  REV
D97A 45          0513        FCC   /ENAME/
D97F A4          0514        FCB   '$+128
                 0515        ENDC
D980 57          0516        FCC   /WPEE/
D984 CB          0517        FCB   'K+128
                 0518 *****
                 0519 *   FUNCTION JUMP TABLE
                 0520 *
D985             0521 NTABLE EQU   *            FUNCTION TABLE START
```

```
D985 DA59        0522 FUNDSP FDB   SCAN
D987 DA5A        0523        FDB   DATE
D989 DA5B        0524        FDB   ERRLIN
D98B DA5C        0525        FDB   ERRCOD
0000             0526        IFEQ  REV
D98D DA5D        0527        FDB   ERNAME
                 0528        ENDC
D98F             0529 ARGMRK EQU   *
                 0530 * put all functions without an arguement above
                 0531 * this equate
D98F DA5E        0532        FDB   WPEEK
D991             0533 NTBLEX EQU   *            TABLE END
                 0534 *******
0006             0535 NUMFUN EQU   (NTBLEX-NTABLE)/2 NO. OF FUNCTS
                 0536 ******************************************
                 0537 * THIS IS EXECUTED DURING STARTUP
                 0538 *
                 0539 * Output revision banner
D991 8EDA0F      0540 ADDCOM LDX   #BANNER-1    POINT TO BEFORE BANNER
D994 BDB99C      0541        JSR   $B99C        USE BASIC'S OUTPUT ROUTINE
                 0542 ***********************
D997 7F0149      0543        CLR   AUTOFG        SET UP FOR NO AUTO
D99A 7F014A      0544        CLR   INTFLG        OLD LINE REPEAT FLAG
D99D 8ED91E      0545        LDX   #COMTBL      POINT X TO COMMAND TABLE
D9A0 CE013E      0546        LDU   #$13E        START OF COMMAND VECTOR TABLE
D9A3 AF41        0547        STX   1,U          SAVE COMMAND TABLE ADDRESS
D9A5 860B        0548        LDA   #NUMCMD      GET NUMBER OF COMMANDS
D9A7 A7C4        0549        STA   ,U           SET IT IN TABLE
D9A9 8EDA28      0550        LDX   #COMCOD      COMMAND CODE
D9AC AF43        0551        STX   3,U
                 0552 ************
D9AE 8606        0553        LDA   #NUMFUN      GET NUMBER OF FUNCTIONS
D9B0 A745        0554        STA   5,U          SAVE IT IN TABLE
D9B2 8ED966      0555        LDX   #FUNTBL      GET FUNCTION TABLE ADDRESS
D9B5 AF46        0556        STX   6,U          SAVE IT IN TABLE
D9B7 8EDA37      0557        LDX   #FUNCOD      GET FUNCTION CODE ADDRESS
D9BA AF48        0558        STX   8,U
D9BC 6F4A        0559        CLR   10,U         SET END OF TABLES FLAG
D9BE 8EB277      0560        LDX   #$B277       ?SN ERROR
D9C1 AFC812      0561        STX   18,U         STORE IN NEXT HOOK SLOTS
D9C4 AF4D        0562        STX   13,U         FOR COMS & FUNCT.
D9C6 6F4F        0563        CLR   15,U         SET TOKEN GROUP TO ZERO
D9C8 9E8A        0564        LDX   ZERO
D9CA AFC810      0565        STX   16,U         CLEAR DATUM
                 0566 * JSR RESET ERROR TRAP VALUES   [REF 9-1]
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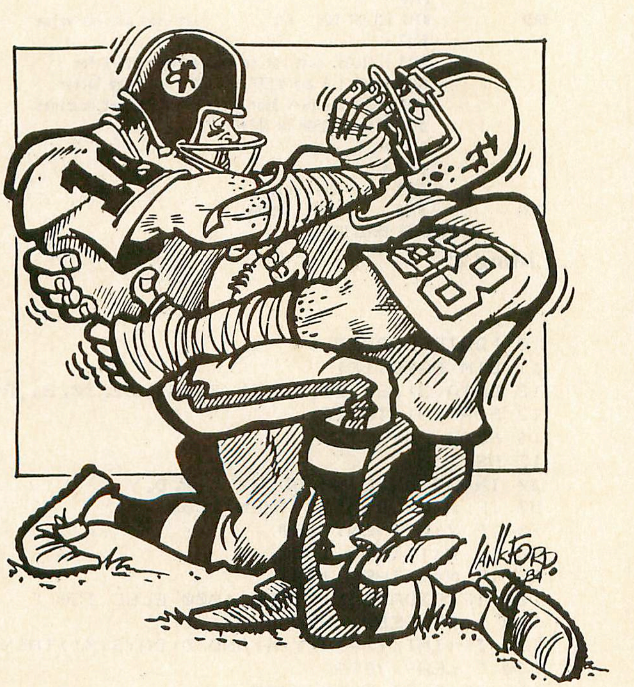

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```
                 0567 * REDIRECT ERRORS TO ERRTRP BY CHANGING JUMP ADDRESS
                 0568 *AT $18F
                 0569 *   LDD #ERRTRP     [REF 9-2]
                 0570 *  STD $18F         [REF 9-3]
                 0571 * [REF 9: Uncomment when ERRORS code is installed]
                 0572
                 0573 *
                 0574        IFDF  PARPRT      DO FOR PARALLEL [REF 10]
                 0575 * [REF 10 & 11: If no conditional assembler and
                 0576 *  parallel port is used, delete IFDF and ENDC
                 0577 *  lines. If not used, delete these and
                 0578 *  all lines in between.]
                 0579 * REDIRECT CALLS FOR OUTPUT VIA [A002] A282
                 0580 * TO ALLOW PARALLEL PORT OPERATION.
D9CD CCDA5F      0581        LDD   #PAROUT     PARALLEL PORT ROUTINE
D9D0 FD0168      0582        STD   $168
                 0583 * NOW INITIALIZE PARALLEL PORT
                 0584 *********************************************
                 0585 *  BASIC PATCH FOR PARALLEL OUTPUT
                 0586 *********************************************
                 0587 *
                 0588 *
                 0589 * THE UART BAUD RATE MSB ($95) IS SET TO I TO
                 0590 * ACTIVATE THE PARALLEL INTERFACE.  SET TO ZERO
                 0591 * FOR THE SERIAL OUTPUT. THIS MEANS 300 BAUD AND
                 0592 * HIGHER WILL ACTIVATE THE SERIAL PORT, 110 OR LOWER
                 0593 * WILL ACTIVATE THE PARALLEL PORT.
                 0594 * THIS IS THE DEFAULT CONDITION.
                 0595 ******************************************
                 0596 * PIA LAYOUT
                 0597 *                BIT 0 UNUSED INPUT
                 0598 *                BIT 1 UNUSED INPUT
                 0599 *                BIT 2 UNUSED INPUT
                 0600 *     FF24       BIT 3 UNUSED INPUT
                 0601 *                BIT 4 UNUSED INPUT
                 0602 *                BIT 5 UNUSED INPUT
                 0603 *                BIT 6 UNUSED INPUT
                 0604 *                BIT 7 PRINTER BUSY=1
                 0605
                 0606 *    FF25        SET TO $4 FOR ALL INPUTS
                 0607
                 0608 *                BIT 0 PARALLEL OUTPUT
                 0609 *                BIT 1 PARALLEL OUTPUT
                 0610 *                BIT 2 PARALLEL OUTPUT
                 0611 *     FF26       BIT 3 PARALLEL OUTPUT
                 0612 *                BIT 4 PARALLEL OUTPUT
                 0613 *                BIT 5 PARALLEL OUTPUT
                 0614 *                BIT 6 PARALLEL OUTPUT
                 0615 *                BIT 7 PARALLEL OUTPUT
                 0616
                 0617 *    FF27        SET TO $2C FOR OUTPUTS & CB2
                 0618
                 0619 *BUSY IS ALSO CONNECTED TO CB1 BUT NOT USED
                 0620 *PIA DETECTS BUSY TO NOT BUSY TRANSITION
                 0621 *
                 0622 * SET UP PIA FOR PARALLEL PORT
D9D3 8EFF26      0623        LDX   #DATA       POINT X TO PIA
D9D6 86FF        0624        LDA   #$FF
D9D8 A784        0625        STA   ,X          SET DATA DIRECTION REG TO $FF
D9DA 862C        0626        LDA   #$2C        SET FOR AUTO STROBE
D9DC A701        0627        STA   1,X         CONTROL REGISTER
D9DE 8604        0628        LDA   #$4         SET UP BUSY PIA
D9E0 A71F        0629        STA   -1,X        POINT FF24 TO DATA REG
                 0630 * SET UP OF PIA COMPLETE
                 0631 * SET UP DEFAULT BAUD RATE
D9E2 CC01CA      0632        LDD   #$1CA       BASICS 120 BAUD
D9E5 DD95        0633        STD   BDFLAG      SET VALUE
                 0634        ENDC              END CONDITIONAL    [REF 11]
                 0635
                 0636 ************************
                 0637 *RUN AUTOEXEC FILE
                 0638 *
D9E7 8EDA02      0639        LDX   #AUTFIL     POINT X TO COMMAND LINE
D9EA CE02DD      0640        LDU   #$2DD       BASIC INPUT BUFFER
D9ED C60E        0641        LDB   #FILEND-AUTFIL NUMBER OF CHARACTERS
D9EF 3444        0642        PSHS  B,U         SAVE COUNT AND BUFFER PNTR
D9F1 BDA59A      0643        JSR   $A59A       MOVE X TO U B BYTES
D9F4 8655        0644        LDA   #$55        WARM FLAG
D9F6 9771        0645        STA   $71         SET IT
D9F8 BDB95C      0646        JSR   $B95C       SET O/P PARAMETERS
D9FB 3514        0647        PULS  B,X         CHAR COUNT $ BUFR PTR IN X
D9FD 301F        0648        LEAX  -1,X        BACK OFF POINTER
D9FF 7EAC7F      0649        JMP   $AC7F       STARTUP BASIC
                 0650 *RETURN TO BASIC ROM
DA02 52          0651 AUTFIL FCS   /RUN"AUTOEXEC"/ 0 BYTE ENDED
DA10             0652 FILEND EQU   *
DA10 52          0653 BANNER FCS   /REV(C)1984 C.STEARMAN<0D><0D>/
                 0654 ********************************************
                 0655 *   COMMAND CODE
                 0656 *This is executed during token interpretation
                 0657 * to jump to correct code
                 0658 *
DA28 81EB        0659 COMCOD CMPA  #HITOKN+NUMCMD HIGHEST LEGAL CODE
DA2A 2303        0660        BLS   GOODVL      GOT A GOOD VALUE
                 0661 *
DA2C 7EB277      0662 SNERR  JMP   >$B277      ?SN ERROR JUMP
                 0663 *
DA2F 8ED950      0664 GOODVL LDX   #COMDSP     POINT TO DISPATCH TABLE
DA32 80E1        0665        SUBA  #HITOKN+1   LOWEST TOKEN IN RANGE
                 0666 * MAKES A HAVE OFFSET INTO DISPATCH TABLE
DA34 7EADD4      0667        JMP   >$ADD4      CALCULATE AND EXECUTE IT
                 0668 ********************************************
                 0669 *  FUNCTION CODE
                 0670 *This is executed during token interpretation
                 0671 * to jump to correct code
                 0672 *
DA37 C15A        0673 FUNCOD CMPB  #$4E+(2*NUMFUN)
DA39 22F1        0674        BHI   SNERR       BAD CODE
DA3B C050        0675        SUBB  #$50        LOWEST FUNCTION NUMBER
DA3D C108        0676        CMPB  #ARGMRK-NTABLE-2 Number of functions not
                 0677 * requiring an arguement, X 2 +2
                 0678 *
                 0679 *ACTUAL TOKEN IS 50/2 + 80 = A8
DA3F 2F07        0680        BLE   NOARG       FIRST FUNCTIONS HAVE
                 0681 *                         NO ARGUMENT
                 0682 *ALL OTHERS DO AND ITS OBTAINED
                 0683 * FIRST HERE
DA41 3404        0684        PSHS  B           SAVE TOKEN OFFSET
DA43 BDB262      0685        JSR   $B262       EVAL BRACKETTED ARGUMENT
DA46 3504        0686        PULS  B           RESTORE OFFSET
DA48 8ED985      0687 NOARG  LDX   #FUNDSP     POINT TO FUNCT. DISPATCH TABLE
DA4B 7EB2CE      0688        JMP   $B2CE       GO LOOKUP AND JUMP
                 0689 ********************************************
DA4E 39          0690 COLD   RTS                          [REF 12]
DA4F 39          0691 WPOKE  RTS                         [REF 13]
DA50 39          0692 FAST   RTS                          [REF 14]
DA51 39          0693 SLOW   RTS                          [REF 15]
DA52 39          0694 XEQ    RTS                           [REF 16]
DA53 39          0695 AUTO   RTS                          [REF 17]
DA54 39          0696 ERRCMD RTS                        [REF 18]
DA55 39          0697 SWAP   RTS                          [REF 19]
DA56 39          0698 BAUD   RTS                          [REF 20]
DA57 39          0699 LDIR   RTS                          [REF 21]
DA58 39          0700 PARA   RTS                          [REF 22]
DA59 39          0701 SCAN   RTS                          [REF 23]
DA5A 39          0702 DATE   RTS                          [REF 24]
DA5B 39          0703 ERRLIN RTS                        [REF 25]
DA5C 39          0704 ERRCOD RTS                        [REF 26]
DA5D 39          0705 ERNAME RTS                        [REF 27]
DA5E 39          0706 WPEEK  RTS                         [REF 28]
DA5F 39          0707 PAROUT RTS                        [REF 29]
                 0708
                 0709
                 0710
DA5F             0711 ZZLAST EQU   *-1         last used address value
                 0712 *
                 0713 * ZZLAST must not be greater than $DFFF for
                 0714 * DOS 1.0 and $DEFF for DOS 1.1.   The latter
                 0715 * has the OS-9 Boot program and SWI set routines
                 0716 * from $DF00 to $DF4C
                 0717 *
                 0718 *
                 0727        OPT   LIS
D991             0728        END   ADDCOM
          NO ERROR(S) DETECTED
```

Listing 2:

```
10 'DATE LOADER
11 DIM DAYS(12)
12 DATA 31,28,31,30,31,30,31,31,30,31,30,31
13 FOR I=1 TO 12
14 READ DAYS(I)
15 NEXT
30 INPUT"DATE(MM,DD,YY)";M,D,Y
50 IF M<0 OR M>12 THEN 1000
70 IF Y<0 THEN 1000
80 IF D<1 THEN 1000
90 IF M=2 THEN 120
100 IF D>DAYS(M) THEN 1000 ELSE 150
110 ' DO FEBRUARY
120 IF(INT(Y/4)<>Y/4)AND(D>DAYS(M))THEN 1000
130 ' LEAP YEAR
140 IF D>29 THEN 1000
150 DATE =(Y*INT(2^9))+(M*INT(2^5))+D
160 WPOKE &H14E,DATE
170 END
1000 PRINT"ERROR":GOTO30
```

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The program features a partial high-resolution character generator and Hi-Res (*PMODE4*) maps. The user may try *PMODE3* and the high-speed poke (*65495,0*) to modify the graphics display.

To use *Mystery*, just run it. The directions are part of the program start-up. Once the clues are displayed on the screen, enter 'G' to make a guess at the country's name or 'N' for the next clue. At the end of each round the start-up prompts are recycled to allow every new player to read the directions. The original version of this program has five additional countries/clue sets. This version is available for $5 from: Tony Hallen, 316 S. Jackson St., Rushville, IL 62681.

32K
ECB

By Tony Hallen

		2515	236
22	145	3025	221
39	12	3060	226
1040	27	3085	178
2010	145	4010	72
2230	176	END	123

The listing:

```
1 CLS: PRINT@235,"WORKING...
3 PCLEAR4:PMODE4,1:CLEAR5000
4 GOSUB 4000
5 DIM CLUE$(4,9), MAP$(4,2), MAR
KER(4), ANS$(4)
7 NOISE$="L100AEFDCGEBAFEGDAO2":
 N1$="L1000+DEFADECCADEGDAECFF":
 N2$="L1000-AGCEDAGFEADGCDEGFO2"
10 MAP$(0,0)="BM174,84M+2,0M-14,
+18M+6,8D4M-6,3M-6,12M-6,2M-6,9L
24M-14,7M-6,3M-4,-8L2E5L4M-6,-4L
4U6E8H4U3E4H8R4U6M+6,-14E4U3L2U3
L16U4L8
12 MAP$(0,1)="U2M+2,-7L4U2H3E6R4
E5R6D2M+26,4R12D1R8M+12,2D2M+22,
6U2M+6,1F3M+14,2M+4,-4M+4,7M-2,+
5M-12,8M-10,5
14 MAP$(0,2)="BM84,133M-4,3D1L2M
+2,-3L10M+2,-9U9H2U2R2U2L6U2M+10
,-22U8M74,66
20 MAP$(1,0)="BM138,27M+8,11G5M1
44,42F5M-2,6M+6,-5M+12,6D3M172,5
6M+20,8F9R6D5M210,82M-4,8M-8,6G8
M186,112D6M-6,10M-6,11M-24,6G8D6
M-8,9M-4,7M-6,2M118,180M-2,-5M-1
```

```
0,-9L4E13U12M-4,-1
22 MAP$(1,1)="M102,132U7M+4,-9M-
4,-9L8M-2,-12L6H2M72,90U10M-12,4
L8M-2,-4L6H5M34,70M+6,-9M+10,-5U
6M52,44U4R6U2M-4,2U4R6M+4,-1M+10
,5M+8,-4M78,24M+6,2M+12,-4R2M+2,
4L2D8F2R14M+4,-3M126,35M138,27
29 'AUSTRALIA
30 MAP$(2,0)="BM162,40R2M+2,6D6F
M+2,2R4D1M+6,17R4M+6,3D2M188,86E
3M+4,9F8D12M-4,8D3M-10,12D2G2D6M
-10,3D2L8U1H2G2M152,148U3L4M-2,-
9G2U6G3H2R2U7G8M134,128H4U4L6U2L
10M-10,4H1M94,126L10M-10,5M-10,-
3H2E4U8M-4,-12H4R2L2M52,96
32 MAP$(2,1)="R4M-2,-7U6M+8,-7M+
16,-2E4M+4,-9D2R4U3F2M94,53M+10,
-5D2F4R4D2R2D2R4H4M116,45R6U2L2U
2M+18,6E2D2M-4,7F2M+12,6D2R6M162
,40
35 'CHINA
36 MAP$(3,0)="BM236,32D9M-2,6G3D
10G6L4D3L2M-8,10L4G4H2U7M188,84L
4D3M+6,3D1R4U2R8D2F1M-6,2G7M204,
119D4L4D2R1F2D4M-8,16F2L2D1M-18,
14D4H4G2H2D4M156,173D2G2H4U2L8H1
0M-16,3M112,171H2L2U1H1U1L2U2E2H
3U4H2G2L2M+6,-8U11L4U2L4E1U3M92,
128
38 MAP$(3,1)="G2M-14,4M-12,3G4U4
M-6,-4M-10,-3M24,103U3E2U6R1E4U4
H2L2M-2,-7M-4,-11L2U2E3M+8,2E2R1
0M+4,-2U3R2U10M+10,2H2U2R2E4M+10
,1U1H2E3M78,30M+8,9D11M+14,8M+4,
5F2M+24,6R4M156,67E6U5R8M+12,-8R
6E1H4L4G2H3E1U8M+4,2M+6,-3U3E2U4
E1U1L2U3M194,15
39 MAP$(3,2)="M+10,2M+10,13R4F6M
236,33
40 'CHILE
41 MAP$(4,0)="BM120,7U1E2U2D1F2D
5F2DD2R2G4D3R2M+4,11R4D5G6M130,5
1M-6,13D14R2D8G2D4F2D3G2D11G2D11
F2D12F4D1L2D5F2M124,156M-2,4M+8,
10E2F2E2M+4,2M144,181R2F2D1L1G2L
4M-12,-7H6U5H2U3E2U2G4U5G2U6E2U3
M112,144U2E2U1E2U6D8R2U19L4D9M11
4,106
42 MAP$(4,1)="H2U3H2E2M118,79M-2
,-13R2U5L2M+2,-17E2U3H2U28M120,7
1000 'BEGIN LOADING ARRAY
1020 HEADER$="**clues**":TITLE$=
"mystery country":FOOTER$="(N=NE
XT CLUE, G=READY TO GUESS)
1025 FOR T=0TO4:FORS=0TO9:READCL
UE$(T,S):NEXTS:READ ANS$(T):NEXT
 T
1030 IF CNTER=5 THEN RUN ELSE CL
S:PRINT@64,"DO YOU WANT"TAB(64)"
INSTRUCTIONS (Y/N)?
1035 A$=INKEY$: IF A$<>"Y" AND A
$<>"N" THEN 1035 ELSE IF A$="N"
THEN 1100
1040 CLS:PRINT@8,TITLE$;TAB(64);
"THIS PROGRAM WILL PRESENT"TAB(3
2)"YOU WITH FACTS OR 'CLUES'"TAB
(32)"CONCERNING A 'MYSTERY COUNT
RY.'
1045 PRINT:PRINT"YOUR JOB IS TO
GUESS THE NAME"TAB(32)"OF THIS C
OUNTRY.  YOUR SCORE"TAB(32)"WILL
 BE LOWER FOR EACH CLUE"TAB(32)"
THAT YOU NEED TO SOLVE THE"TAB(3
2)"'MYSTERY.'
1050 GOSUB2400
1055 PRINT@8,TITLE$:PRINT:PRINT"
AFTER EACH CLUE YOU MAY ASK"TAB(
32)"FOR ANOTHER CLUE BY PRESSING
"TAB(32)"'N' FOR 'NEXT CLUE,' OR
 YOU"TAB(32)"MAY TRY TO GUESS TH
E COUNTRY'S"TAB(32)"NAME BY PRES
SING 'G' FOR"TAB(32)"'GUESS.'
1060 PRINT:PRINT"THE FINAL CLUE
WILL BE AN OUT-"TAB(32)"LINE MAP
 OF THE COUNTRY."TAB(64)"GOOD LU
CK...": GOSUB 2400
```

```
1100 FLAG=0: CNTER=CNTER+1 'KEEP
 TRACK OF # OF GAMES
1110 CLS:PRINT@10,HEADER$:PRINT@
32,STRING$(32,45);:PRINT@480,FOO
TER$;
1115 COUNTRY=RND(5)-1:IF MARKER(
CO)=1 THEN 1115 ELSE MARKER(CO)=
1
1120 FOR CT=0 TO 9:PLAY "O"+STR$
(RND(4)+1):PLAY NOISE$:PRINT@(CT
+3)*32,CLUE$(CO,CT)
1125 A$=INKEY$:IFA$<>"N"ANDA$<>"
G"THEN1125
1130 IF A$="N"THEN NEXTCT:GOSUB2
000
1140 GOSUB2200:GOTO1125
2000 'BEGIN MAP, WRITE MESSAGES
BRANCH  TO GUESS INPUT
2010 COLOR0,1:PCLS:SCREEN 1,1
2015 AA$="THE LAST":DRAW "BM4,10
": GOSUB 4100:AA$="CLUE:":DRAW"B
M4,20":GOSUB4100
2020 FOR T=0 TO 2:DRAW MAP$(CO,T
):NEXT T
2025 GOSUB 2500 'PAINT MAP
2026 IF FLAG=2 THEN AA$="THAT'S"
:DRAW"S4BM4,10":GOSUB4100:AA$="I
T!!":DRAW"BM8,20":GOSUB4100:RETU
RN
2030 FLAG=1:FORT=1TO3000:NEXTT '
FLAG=LAST CLUE INDICATOR
2050 GOSUB 2200:RETURN 'INPUT GU
ESS, RETURN
2100 'GIVE ANSWER
2110 CLS:PRINT@64, "SORRY--THE A
NSWER IS";TAB(64);ANS$(CO);".":
PRINT:PRINT
2120 GOTO 2320
2200 'INPUT GUESS
2205 CLS: PRINT@32,"CAREFULLY TY
PE COUNTRY'S NAME";TAB(32);"(SPE
LLING MUST BE EXACT).
2210 PRINT:PRINT:INPUT GUESS$
2215 IF GUESS$=ANS$(CO) THEN 230
0
2217 PLAY "O1L30ECDEEDCCDEDDECCE
DDO2
2220 IF FLAG=1 THEN 2100
2225 PRINT:PRINT"NOPE. TRY AGAIN
.";TAB(64);"(PRESS ANY KEY TO RE
TURN)
2230 IF INKEY$=""THEN2230
2235 CLS:PRINT@10,HEADER$:PRINT@
32,STRING$(32,45);:PRINT@480,FOO
TER$;
2245 FOR T=0TOCT:PRINT@32*(T+3),
CLUE$(CO,T):NEXTT
2250 RETURN
```

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```
2300 'SCOREBOARD FOR CORRECT ANS
WER
2302 FLAG=2:COLOR0,1:PCLS:SCREEN
1,1:GOSUB 2020
2304 FOR T=1 TO 2: SCREEN 1,0:PL
AY N1SE$:SCREEN1,1:PLAY N2SE$:NE
XTT
2310 CLS:PRINT:PRINT:PRINT"YOU G
UESSED IN"CT+1"CLUES";TAB(64);"F
OR A SCORE OF";100-CT*3;"....";T
AB(64);"GOOD JOB!
2320 PRINT:PRINT "TRY ANOTHER GA
ME (Y/N)?"
2330 Z$=INKEY$: IF Z$="Y" THEN 1
030 ELSE IF Z$="N" THEN PRINT:PR
INT"BYE-BYE.":PRINT:END ELSE GOT
O 2330
2400 'PROMPT FOR TURNING PAGE
2410 PRINT:PRINT "PRESS <ENTER>
TO GO ON...":LINEINPUT Z$
2420 CLS
2430 RETURN
2500 'PAINT ROUTINE
2510 IF CO<>5 THENPAINT(122,92),
0,0
2515 IF CO=4 THEN PAINT(132,176)
,0,0
2520 IF CO=5 THEN PAINT(152,72),
0,0:PAINT(128,100),0,0:PAINT(132
,35),0,0
2525 IF CO=7 THEN PAINT(144,87),
0,0:PAINT(148,90),0,0:PAINT(47,9
2),0,0
2530 RETURN
3000 DATA"SIZE OF COLORADO + WYO
MING","1,300 MILES OF COASTLINE"
,"AVG. RAINFALL LESS THAN 20 IN.
","41% OF LAND USED FOR FARMING"
,"   MUCH IRRIGATION USED
3005 DATA"PRINCIPAL PRODUCTS: WI
NE, OLIVES","     VEGETABLES, CIT
RUS FRUIT","     TEXTILES,   FOOT
WEAR"
3010 DATA"RELIGION: MOSTLY ROMAN
 CATHOLIC","3RD LARGEST EUROPEAN
 COUNTRY",SPAIN
3015 DATA "POPULATION: 124,700,0
00","    63% LIVE IN CITIES","ETH
NICS: PORUGUESE, AFRICAN","RELIG
ION: 90% ROMAN CATHOLIC","LARGER
 THAN CONTINENTAL U.S","4,603 MI
LES OF COASTLINE","CLIMATE: TROP
ICAL/SEMI-TROPICAL"
3020 DATA "PORTUGUESE IS OFFICIA
L LANGUAGE","WORLD LEADER IN COF
FEE EXPORTS","LARGEST COUNTRY IN
 S. AMERICA",BRAZIL
3025 DATA "POPULATION: 14,926,80
0","   60% LIVE IN CITIES","ABOU
T THE SIZE OF CONT. U.S.","MUCH
DESERT AND ARID LAND","OFFICIAL
LANGUAGE: ENGLISH","95% OF POP.
IS ENGLISH
3030 DATA "IS A STRONG U.S. ALLY
","YOUNGER THAN U.S. AS A NATION
","PRODUCES MUCH WOOL & MUTTON",
"LOCATED IN SOUTHERN HEMISPHERE"
,AUSTRALIA
3035 DATA "POPULATION: 1,004,000
,000","MOST LIVE ON FARMS","RELI
GION: BUDDHISM, CONFUCIANISM","
  1/10 OF LAND IS CULTIVATED","2
/3 OF LAND DESERT OR MOUNTAINS",
"HAS HIGHEST SPOT IN WORLD","70%
 LITERACY RATE"
3040 DATA "COMMUNIST GOVT.","KNO
WN FOR TEA & SILK PROD.","2ND LA
RGEST COUNTRY IN WORLD",CHINA
3045 DATA "POPULATION: 11,100,00
0","    80% LIVE IN CITIES","SLIG
HTLY LARGER THAN TEXAS","2,650 M
ILES OF COASTLINE","VERY MOUNTAI
NOUS","OFFICIAL LANGUAGE: SPANIS
H","RELIGION: ROMAN CATHOLIC","P
RESIDENT IS HEAD OF GOVT."
3050 DATA "EXPORTS 10% OF WORLD'
S COPPER","LOCATED IN WESTERN HE
MISPHERE",CHILE
```

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```
3055 DATA "POPULATION: 3,100,000
","   83% LIVE IN CITIES","SIZE
OF COLORADO","HILLY AND MOUNTAIN
OUS","OFFICIAL LANGUAGE: ENGLISH
","84% OF POPULATION IS ENGLISH"
,"99% LITERACY RATE","CHIEF PROD
UCTS: GRAIN, TEXTILES","QUEEN IS
 TITULAR HEAD OF STATE"
3060 DATA "LOCATED IN SOUTHERN H
EMISPHERE",NEW ZEALAND
3065 DATA "POPULATION: 6,343,000
","LANGUAGES: GERMAN, FRENCH","R
ELIGION: ROM. CATH., PROTESTANT"
,"99% LITERACY RATE","2 TIMES TH
E SIZE OF MASS.","MOUNTAINS COVE
R 70% OF LAND","PRESIDENT IS HEA
D OF STATE","PRODUCTS: INSTRUMEN
TS, WATCHES"
3070 DATA"               CHOCOLATE,
CHEESE","              BANKING",SWIT
ZERLAND
3075 DATA "POPULATION 10,000,000
","   34% WORK ON FARMS","OFFICI
AL LANGUAGE: SPANISH","ETHNICS:
NEGRO, SPANISH","96% LITERACY","
SLIGHTLY SMALLER THAN PENN.","2,
500 MILES OF COASTLINE","COMMUNI
ST DICTATORSHIP","PRODUCTS: SUGA
R, TOBACCO"
3080 DATA "A CARIBBEAN COUNTRY",
CUBA
3085 DATA "POPULATION: 700,000,0
00","   22% LIVE IN CITIES","36%
 LITERACY RATE","1/3 THE SIZE OF
 TOTAL U.S.","HAS HIGHEST MOUNT.
 RANGE","VERY DENSELY POPULATED"
,"PRESIDENT IS HEAD OF STATE","P
ARLIAMENTARY GOVERNMENT"
3090 DATA "PRODUCTS: TEXTILES, S
TEEL","          RICE,      GRAIN
S",INDIA
3095 DATA "POPULATION: 69,400,00
0","   65% LIVE IN CITIES","74%
LITERACY RATE","OFFICIAL LANGUAG
E: SPANISH","3 TIMES THE SIZE OF
 TEXAS","45% OF LAND IS ARID","A
VERAGE ALTITUDE: 3,000 FT."
3100 DATA "PRESIDENT IS HEAD OF
GOVT.","PRODUCTS: COTTON, SUGAR
CANE","          COFFEE, RUBBER"
,MEXICO
4000 'CHARACTER DATA
4001 DIM CC$(12)
4002 CC$(0)="U4;E2;F2;D2;NL4;D2;
BM+3,0" 'A
4003 CC$(1)="BM+1,-0;H1;U4;E1;R2
;F1;BM+0,4;G1;L2;BM+6,0" 'C
4004 CC$(2)="NR4;U3;NR2;U3;R4;BM
+3,+6" 'E
4005 CC$(3)="U3;NU3;R4;NU3;D3;BM
+3,0" 'H
4006 CC$(4)="BM+1,0;R1;NR1;U6;NL
1;R1;BM+4,+6" 'I
4007 CC$(5)="NU6;R4;U1;BM+3,+1"
'L
4008 CC$(6)="BM+0,-1;F1;R2;E1;U1
;H1;L2;H1;U1;E1;R2;F1;BM+3,+5" '
S
4009 CC$(7)="BM+2,+0;U6;NL2;R2;B
M+3,+6" 'T
4010 CC$(8)="BM+0, -1;NU5;F1;R2;
E1;U5;BM+3, 6" 'U
4011 CC$(9)="BM+2,+1;U1;BM+0,-2;
U5;BM+5,7" '!
4012 CC$(10)="BM+2,-1;U1;BM+0,-2
;U1;BM+5,+5" ':
4013 CC$(11)="BM+1,-5;E2;BM+4,+7
" '

4014 CC$(12)="BM+6,0" '" "
4015 RETURN
4100 'WRITE 'EM
4110 FOR XX=1 TO LEN(AA$)
4120 X$=MID$(AA$,XX,1)
4130 CC=INSTR(1,"ACEHILSTU!:'",X
$)-1: IF CC<0 THEN CC=12 'MAKES
BLANKS FROM UNKNOWN CHARS
4140 DRAW CC$(CC)
4150 NEXTXX:RETURN
```

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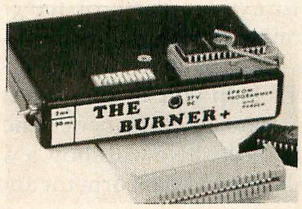

EDUCATION NOTES

16K
ECB

With school getting underway, it's time to make a date for learning — and let the kids help

Create A Calendar

By Steve Blyn
Rainbow Contributing Editor

September is back to school time. Unlike the usually sluggish end of the school year, children are quite motivated to learn at this time. Although few will admit it, children often get bored by the end of the summer vacation and are glad to return to school.

It's a good idea to seize this moment of enthusiasm before it fades. One way is to explain some of the exciting upcoming events that you have planned for your children or students.

To help you accomplish this, we will illustrate a September calendar on your CoCo. We also will show a way to print a blank calendar form for any month on a printer.

Our program will draw an outline of the calendar for September on Lines 30 to 250. When you run this program you will notice several space size limitations on this calendar. These are due to the limitations of the screen size of our computer. There are, of course, no space limitations on the printer portion of the program.

Having only 32 spaces across horizontally and 16 vertical lines presents some space problems. Although some months have parts of six weeks, we could only fit five weeks on the screen. We had to include Sept. 1 above Sept. 8 in the line with the name of the month. The names of the days of the week also were compromised by being placed at the bottom of the screen. Please keep in mind that the other popular competitive computers currently sold would all present similar screen limitations.

> ***"It's a good idea to seize this moment of enthusiasm before it fades."***

Here are some of the ways that we have used the screen calendar portion of this program with children:

1) Review the September holidays. What are their dates? What days of the week are these?

2) Review any student birthdays or any class trips for the month.

3) How many Mondays or Wednesdays are there in this month? Are there more of a certain day than another? For example, are there more Wednesdays or Saturdays?

4) Which date is 10 days after Sept. 8? Which is 17 days after Sept. 4? Which date is 12 days before Sept. 29?

5) What day of the week was the last day in August? What day of the week will the first day in October be?

6) Which date is the fourth Thursday in September? Which is the third Monday?

7) How many more days is it until Freddy's birthday on Sept. 12 or Cheryl's on Sept. 26?

After the calendar appears on the screen, you may press 'E' to end the program or 'P' to printout a blank calendar form on your printer. This choice appears on Lines 260-270.

The remainder of the program is the printer routine. This appears on Lines 280-390. If you do not have a printer, the program need not be keyed in beyond Line 250.

(Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He and his wife, Cheryl, own Computer Island.)

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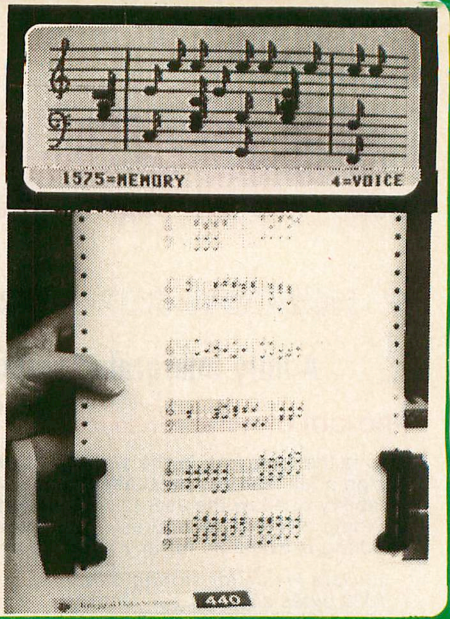

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We have included no printer control codes. This is because there is such a wide variety of printers that are used with CoCos. Each printer has its own accompanying control codes. We suggest that you first select the elongated mode on whichever printer you use. You will then get the largest calendar possible. This will fill up most of an 8 by 11 sheet of paper.

The blank form has no month indicated nor has it any days indicated. This is done to enable you to use it for any or all months. Filling in the dates is, of course, one of the child's activities.

Each month, a new form could be handed out to your child or students. If you have a large amount of students, it is best to have copies of an original made rather than to run off too many copies on your printer. Most of our printers are not really made for the heavy use of multiple copies.

Once the dates are filled in on the calendar, it is time to indicate the special events and birthdays of that month. September is a good example of a month with many special days. Among others, they include Labor Day, the beginning of Autumn, Rosh Hashana, and RAINBOWfest, Princeton, New Jersey!

We hope you and your children enjoy using these calendars. We, at Computer Island, would of course enjoy hearing of any other ways you can think of to use the calendar.

210 45
END 211

The listing:

```
10 REM"STEVE BLYN"
20 REM"COMPUTER ISLAND,NY,1984
30 CLS
40 A$=" "+STRING$(30,207)
50 B$=" *   *   *   *   *   *
*   *"
60 FOR T= 1 TO 5
70 PRINTA$:PRINTB$:PRINTB$
80 NEXTT
90 PRINT@27,"1";
100 PRINT@11,"september";
110 FOR T=2 TO 8:PRINT@34+N,T;:N
=N+4:NEXT
120 N=0
130 FOR T=10 TO 15:PRINT@133+N,"
*";T;:N=N+4:NEXT
140 PRINT@131,"9";
150 PRINT@157,"*";
160 N=0
170 FOR T=17 TO 22:PRINT@229+N,"
*";T;:N=N+4:NEXT
180 PRINT@227,"16";
190 PRINT@253,"*";
200 N=0
210 FOR T=24 TO 29:PRINT@325+N,"
*";T:N=N+4:NEXT T
220 PRINT@323,"23";
230 PRINT@349,"*";
240 PRINT@419,"30";
250 PRINT@480," SUN MON TUE WED
 THU FRI SAT ";
260 EN$=INKEY$
270 IF EN$="E" THEN 390 ELSE IF
EN$="P" THEN 280 ELSE 260
280 CLS:PRINT"WHAT IS THE NAME O
F THIS MONTH":INPUT M$
290 PRINT#-2,TAB(5) "CALENDAR FO
R ";M$
300 A$=" "+STRING$(29,"#")
310 PRINT#-2," "
320 PRINT#-2,A$
330 PRINT#-2,"  SUN MON TUE WED
THU FRI SAT"
340 FOR A= 1 TO 6
350 PRINT#-2,A$
360 FOR B= 1 TO 4:PRINT#-2,B$:NE
XT B
370 NEXT A
380 PRINT#-2,A$
390 CLS:END
```

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COCO GRAPHICS

16K
ECB

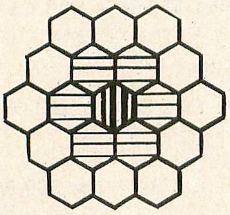
Build A Honeycomb From BASIC

By Don Inman
Rainbow Contributing Editor

Review of LOGO Honeycombs

Last month a group of simple Color LOGO procedures was developed to draw a honeycomb of hexagons. The procedures and final results are repeated here so that you can compare them to the BASIC program presented in this issue.

Figure 1:



```
TO BEE                              ←   main procedure
  CLEAR
  HEX HEX6 HEX12
END

TO HEX                              ←   center hexagon
  REPEAT 6(FD 15 RT 60)
END
```

(Don Inman is the acknowledged master of microcomputer graphics and the author of a large number of books. He has been working with Color LOGO since it was introduced. His column concerns a blend of graphics produced by both Color LOGO and Extended Color BASIC.)

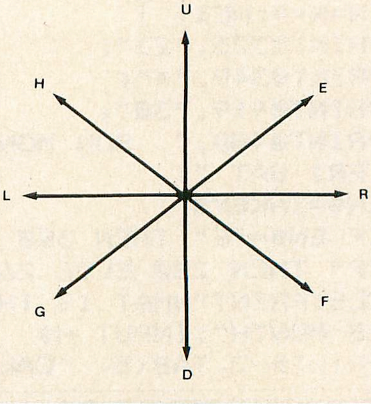
```
TO HEX6                             ←   central ring
  PU RT 120 FD 15 LT 60
  FD 15 LT 60 PD
  REPEAT 6(HEX FD 15 LT 60)
END

TO HEX 12                           ←   outer ring
  PU RT 120 FD 15 LT 60
  FD 15 LT 60 PD
  REPEAT 6 (HEX FD 15 LT 60 HEX FD 15 RT 60 FD 15
    LT 60)
END
```

BASIC Honeycombs

Color LOGO can easily draw a wide variety of geometric figures due to its ability to turn any angle before drawing a line. Extended Color BASIC has the *DRAW* command to draw in a similar manner. However, *DRAW* is limited to angle changes that are multiples of 45 degrees.

Figure 2



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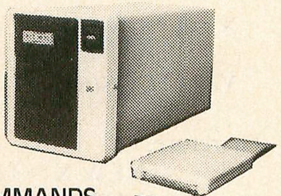

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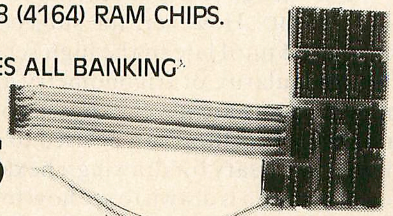

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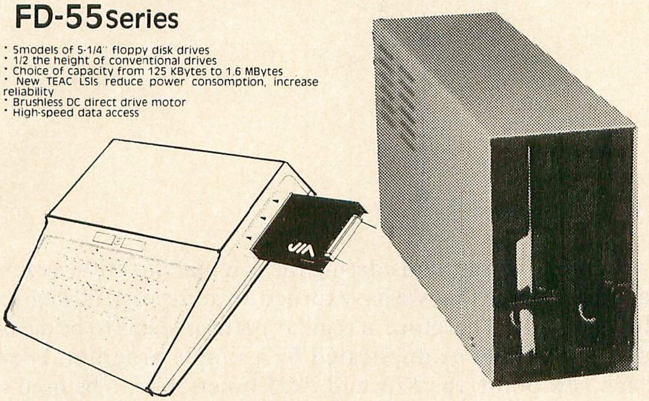

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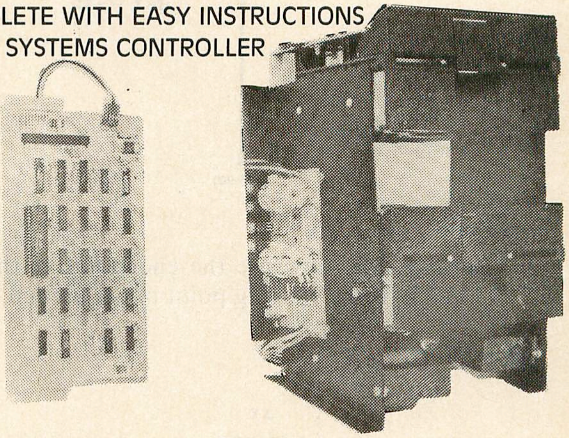

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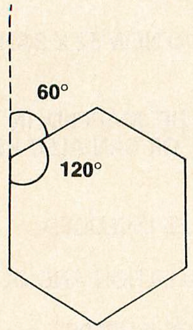
A hexagon is made of six sides with interior angles of 120 degrees. Thus, each succeeding side must be rotated 60 degrees from the direction at which the last side was drawn. The *DRAW* command of BASIC cannot be used in this case.

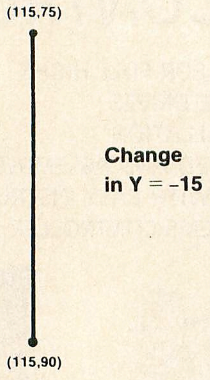
Figure 3



A knowledge of trigonometric functions can come to the aid of BASIC. However, the subject of trigonometry is not introduced until late in the high school curriculum. Due to the unpopularity of trigonometry and other math courses, many students are never exposed to its magical ratios. Sine and cosine functions can be used to calculate the end points of sides necessary for drawing a hexagon. Let's take a look at how a hexagon is drawn to see how to use some trigonometry.

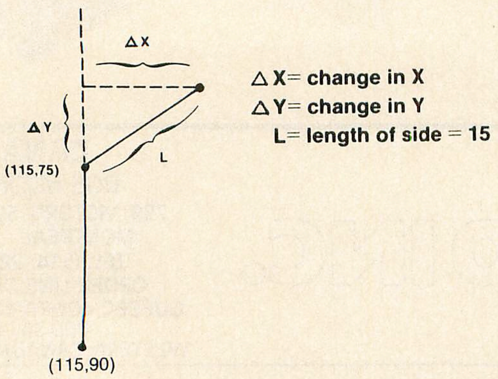
1) First side: select an arbitrary starting point, say X= 115 and Y = 90. If we draw the first side straight up (an angle of 0 degrees), only the Y value will change.

Figure 4



2) Second side: now use the end point of the first side (115,75) as the starting point of the second side.

Figure 5



The sine of an angle is the ratio of the side opposite the angle to the hypotenuse, and the cosine of an angle is the ratio of the side adjacent to the angle to the hypotenuse. In this case,

$$\mathrm{SIN}(60) = \frac{\Delta X}{L} \qquad \text{and } \mathrm{COS}(60) = \frac{\Delta Y}{L}$$

From these ratios, it follows that:

$X = L*\mathrm{SIN}(60)$

$Y = L*\mathrm{COS}(60)$

values may be found in standard trig tables

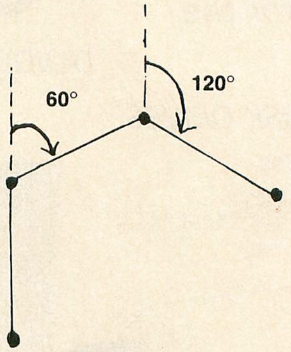
Therefore,

NEW X = 115 + (15*.866) or about 128
NEW Y = 75 - (15*.500) or about 82.5

It would be rather tedious to calculate all the necessary endpoints when BASIC has built-in *SIN* and *COS* functions that will do all the work for us. However, BASIC requires that the values of the angles be given in radians rather than degrees. There are 2π radians in a circle corresponding to the 360 degrees in a circle. A π is approximately equal to 3.1416. Therefore, 60 degrees is approximately equal to $2\pi/6$ or about 1.0472 radians.

3) The third side is drawn by turning 60 more degrees or 120 degrees from the original direction.

Figure 6



In other words, considering the original direction as zero degrees, we see that we have turned an additional 60 degrees for each side. Therefore, a regular pattern seems to be developing that may be duplicated by a simple program. From each new point, the *SIN* and *COS* functions can be used to calculate the next point. This seems like an ideal use for the *LINE* command.

```
LINE(OLDX,OLDY) — (NEWX,NEWY),PSET
```

A simple *FOR-NEXT* loop duplicates the pattern.

```
FOR Z = 0 TO 5
 A = Z*1.0472                  ← angle increases
 XA = X+15*SIN(A)              ← X end point
 YA = Y-15*COS(A)              ← Y end point
 LINE(X,Y)-(XA,YA),PSET        ← draw line
 X=XA: Y=YA                    ← end point becomes new
NEXT Z                           start point
```

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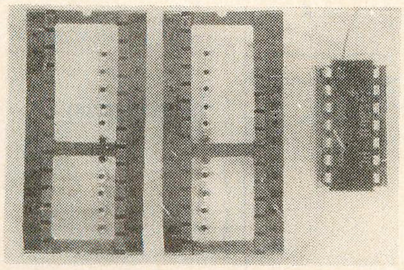

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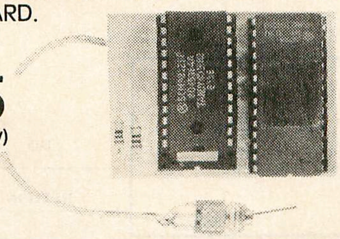

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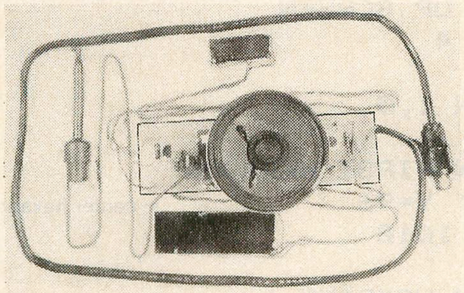

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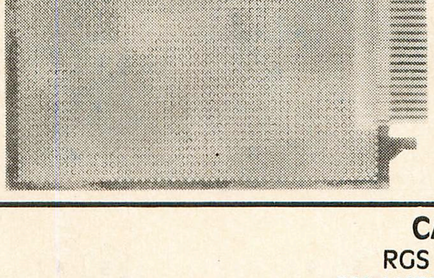

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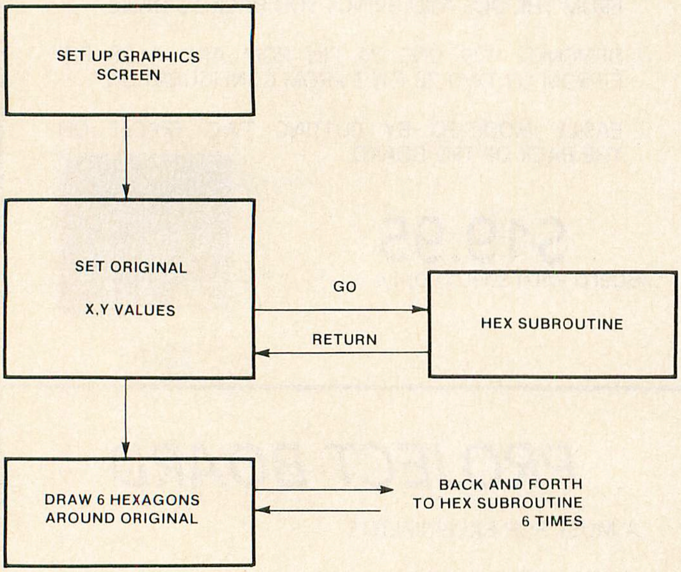
This hexagon draw routine can be used over and over again as long as the original X,Y values are supplied. Therefore, it seems logical to place it in a subroutine.

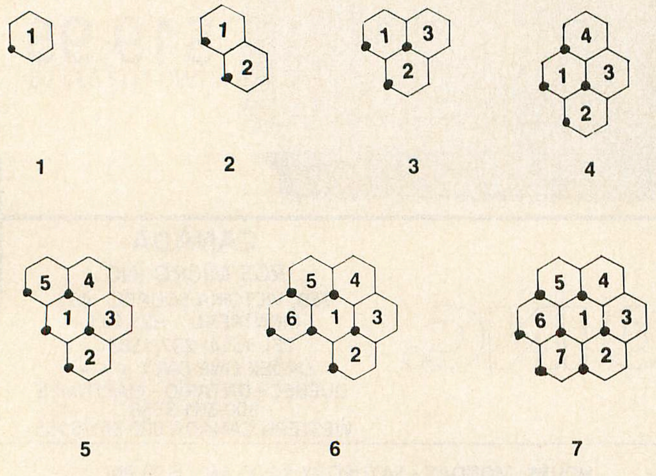
Before going further, let's stop and think about how the program will be developed. A simple block diagram of the honeycomb problem with a central hexagon and one ring of hexagons follows.

Figure 7


SET UP GRAPHICS SCREEN
SET ORIGINAL X,Y VALUES
GO
RETURN
HEX SUBROUTINE
DRAW 6 HEXAGONS AROUND ORIGINAL
BACK AND FORTH TO HEX SUBROUTINE 6 TIMES

Once the hexagon subroutine is finished, it can be used to draw encircling hexagons by merely calculating the beginning point for each new hexagon. Note that the sides of all hexagons are drawn in the same relative order. Also notice that each drawing ends at its original starting point.

Figure 8

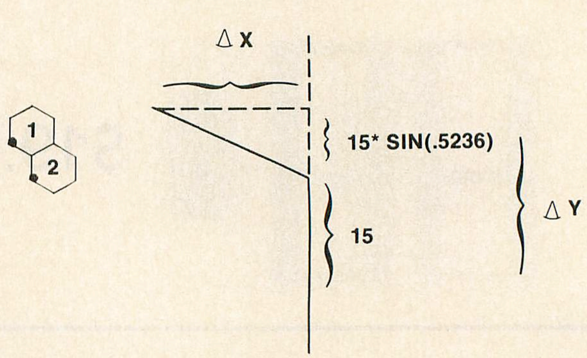


Graph paper with hexagonal elements rather than square elements is a great aid in planning the necessary moves between drawings. The move from the center hexagon (1) to the first hexagon in the next ring (2) is calculated as follows:

$$X = X + \underbrace{15*COS(.5236)}_{\Delta X}$$

$$Y = Y + \underbrace{15 + 15*SIN(.5236)}_{\Delta Y}$$

Figure 9



Moves to other hexagons in the outer ring are calculated in a similar way. There are many ways that these moves may be incorporated into the program. The method demonstrated here uses five distinct moves (one is repeated). However, considering the addition of more rings to those that now exist, it appears that the moves will be repeated in the future. Therefore, each move is put into its own subroutine.

1000 83
END 117

```
200 ' SET UP SCREEN
210 PMODE 4
220 PCLS
230 SCREEN 1,0
299 '
300 ' DRAW FIRST HEXAGON
310 X=115: Y=96                    ← center hexagon
320 GOSUB 1010
399 '
400 ' DRAW HEXRING 1
410 FOR Q=1 TO 6                   ← 6 hexagons
420 ON Q GOSUB 2010,2110,2210,23
10,2410,2010                       ← get start points
430 GOSUB 1010                     ← draw hexagon
440 NEXT Q
499 '
900 ' LOOP HERE
910 GOTO 910                       ← look at result here
999 '
```

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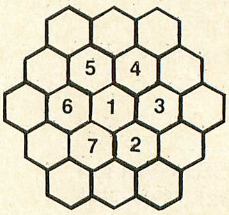
The Subroutines

```
1000 ' DRAW HEXAGON SUBROUTINE
1010 FOR Z=0 TO 5
1020 A=Z*1.0472
1030 XA=X+15*SIN(A)
1040 YA=Y-15*COS(A)
1050 LINE(X,Y)-(XA,YA),PSET
1060 X=XA: Y=YA
1070 NEXT Z
1080 RETURN
1999 '
2000 ' CALCULATE START POINTS
2010 X=X+15*COS(.5236): Y=Y+15+1
5*SIN(.5236)
2020 RETURN
2100 '
2110 X=X+15*COS(.5236): Y=Y-15-1
5*SIN(.5236)
2120 RETURN
2200 '
2210 X=X-15*COS(.5236): Y=Y-15-1
5*SIN(.5236)
2220 RETURN
2300 '
2310 X=X-30*COS(.5236)
2320 RETURN
2400 '
2410 X=X-15*COS(.5236): Y=Y+15+1
5*SIN(.5236)
2420 RETURN
2500
```

Adding more Hex rings should now be simple. Previous starting point moves can be used.

Figure 10



To complete this outer ring we need to add a section to the main program and one new move subroutine.

Add to main program:

```
500 ' DRAW HEXRING 2
510 FOR Q=1 TO 12
520 ON Q GOSUB 2010,2510,2110,21
10,2210,2210,2310,2310,2410,2410
,2010,2010
530 GOSUB 1010
540 NEXT Q
```

Add this subroutine:

```
2510 X=X+30*COS(.5236)
2520 RETURN
```

How about trying another Hex ring? Your turn! Then try filling the whole screen.

Hint . . .

Is Your Printer On Line?

The CoCo is able to tell when the printer is on line and when it is off line. Here's a program to determine which state the printer is in.

```
10 I=PEEK(65330)
20 W=PEEK(65334)
30 U=PEEK(65318)
40 IF U=I AND U=W AND I=W THEN 5
0 ELSE 10
50 PRINT I
60 GOTO 10
```

If, I, U and W have the same value then the number displayed will be the number that determines whether the printer is on or off line.

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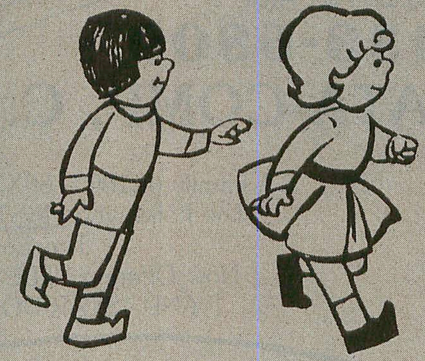

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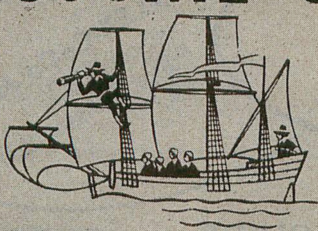

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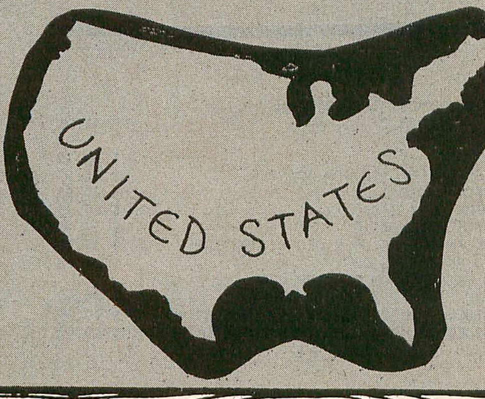

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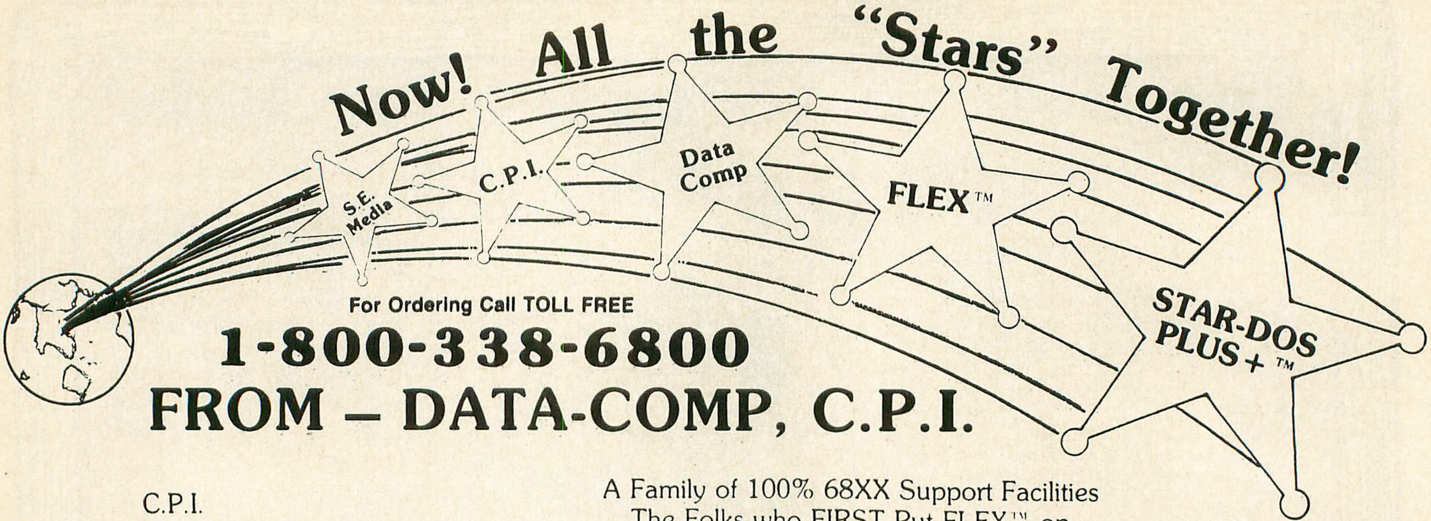

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Practicing *LINE* And *DRAW* — Without Drudgery

By Joseph Kolar
Rainbow Contributing Editor

Like they say, "if it isn't interesting, it's just a lot of drudgery." That holds for programming! Boring tasks are likely to be shunted aside and perhaps, never pursued. The only solution is to make "it" challenging so it becomes a fun project.

"It" is the graphics capability of the Color Computer. Lurking in Extended Color BASIC, awaiting your bidding, are the powerful *LINE* and *DRAW* statements. They lie at the heart of CoCo's awesome graphics capability. Simply put, it is the ability to draw a line, in any available color, beginning at any predetermined location and proceeding to any other designated location on the screen.

Since it is useful to become familiar with the elements of these statements, let us manipulate these valuable tools. Let us practice using them; observe the results; enjoy the experience.

By now, you must have noted the tendency to overwork the words "fun" and "create." Each session at the computer, for the newcomer, should be an adventure that is fun and becomes a creative experience.

(Joseph Kolar is a free-lance writer and programmer dedicated to proselytizing for computers in general, and the CoCo specifically.)

Need I remind you to look through your manual, if you want to brush up on *LINE* and *DRAW*?

Copy the following lines:

```
10 PMODE 4,1:PCLS:SCREEN1,1
:COLOR3
100 GOTO 100
```

Add the following program lines, one at a time, *RUN* each one in turn and observe each result.

```
20 LINE(128,0)-(128,76),PSET
21 LINE-(255,96),PSET,B
22 LINE-(128,128),PSET,B
23 LINE-(255,155),PSET,B
24 LINE-(0,20),PSET,B
```

Why didn't we need [,B] at the end of Line 20?

Can you see what you have done? Change *PMODE 4,1* to *PMODE 3,1* in Line 10, and *RUN*. If you are doubtful about what you have wrought, place a *REM* in front of Lines 21 through 24. *RUN* and compare with the results of the last *REMark* uncovered. Remove each *REM* (or ') in turn, *RUN*, and observe what each succeeding line added to the program.

Now that you have studied your creation and understand what each line created, place a *REM* or single quote mark in front of Lines 20 through 24. Rather than delete these lines and having to retype them later, we are putting them into cold storage, ready to be reintroduced into the program, at our pleasure, by editing out the *REM* markers.

For newcomers who are unfamiliar with inserting or deleting a *REM* marker, here is one way to do it: *EDIT21* and ENTER. Using the Space Bar, space over until you are underneath 'L' in LINE. Press 'I', press SHIFT '7' at the same time, and ENTER. *LIST 21*. It is now inserted and the program line is in cold storage. To delete it, *EDIT21* and space over with the Space Bar underneath the single quote. Press 'D', ENTER and Line 21 is thawed out and part of the program.

Review how the *DRAW* statement works in your manual. Pay particular attention to the commands, *U, D, R, L, N,* and *B*. *RUN* to make sure the screen is blank.

Here is the puzzle:

Using the *DRAW* statement, begin at program Line 30 (*30 DRAW"C4BM 128,0*), which is the starting point in Line 20, recreating the contents of Lines 20 through 24, using *U, D, L, R, N,* and *B*.

Note: You may separate each direction command as you add it to the program line, with a semicolon and space; only a semicolon; or only a space, or just bunch them all together without any spaces. For example:

```
DRAW"BM128,96; R5; D5; L5; U5;"
DRAW"BM128,96;R5;D5;L5;U5;"
DRAW"BM128,96 R5 D5 L5 U5"
DRAW"BM128,96R5D5L5U5"
```

As usual, there is more than one way to recreate the "design" in Lines 20 through 24. You may follow the directions in Lines 20 through 24 faithfully or strike off on some other pathway. It doesn't matter how you do it. It is the result that counts.

When you have finished and checked out your work to your satisfaction, prove to yourself that it is identical to the shape in the cold storage Lines 20 through 24.

EDIT the *REM* marker (') from Lines 20 through 24, effectively taking them off ice and reintroducing them to an active roll in the program. *RUN*. If all of your lines are in *C4*, red, congratulations!

If it isn't correct, you will find at least one *COLOR 3*, blue line, and perhaps unwanted or mislocated lines.

Back to the drawing board! Correct Line 30 until it is completely superimposed over Lines 20 through 24.

If you get a bit confused and are not sure of the design in Lines 20 through 24, add Line 25:

```
25 FOR Z = 1 TO 2000: NEXT
```

If you fail to find a good solution, drop me a card (c/o THE RAINBOW) and I'll send you one. But, make it a point to work out your own solution because becoming familiar with the *DRAW* statements should be priority one and will prove invaluable. The *DRAW* statement is very versatile and affords you innumerable solutions for a single problem.

When you have successfully solved this puzzle, you will have gained experience in manipulating and creating lines that accomplish the same mission using either the *LINE* or *DRAW* statements. Which do you prefer?

If you are adventurous, you can fool around and make a combination Line 30, using some *LINE* and some *DRAW* statements.

Remember, there is no rule that states you must use any particular routine because it is shorter. Use whichever you prefer.

Here is another problem. Delete Lines 20 through 30 (*DEL 20-30*). Type in the following lines:

```
20 LINE-(128,96)-(78,46),PSET
21 LINE-(178,146),PSET
22 LINE-(128,96),PSET
23 LINE-(178,46),PSET
24 LINE-(78,146),PSET
```

RUN. It displays a blue X on the screen.

Note: The X could have been created using three program lines. Using the information in Lines 20 through 24, make the X using only three lines.

Here is the answer:

```
20 LINE(78,46)-(178,146),PSET
21 LINE-(178,46),PRESET
22 LINE-(78,146),PSET
```

Back to your manual. Review the *DRAW* statement paying particular attention to *E, F, G,* and *H* options.

The *B* option in the *DRAW* statement is similar to *PRESET* in the *LINE* statement; movement to a new location without revealing the pathway on the display screen.

Delete Lines 20 through 22 if you made the X in the three-line way and retype the original lines — Lines 20 through 24 — as *REM* lines. If you didn't bother making the three-liner, put a single quote in front of Lines 20 through 24. *RUN*. Make sure the screen is blank. Insert Line 30. Begin the line, *30 DRAW"C4BM78,46*. Using the *E, F, G,* and *H* commands create an X exactly the same size and locate it so it is identical to Lines 20 through 24.

Use the same procedure you used previously to see if you superimposed it over the original X. (Delete the *REM* markers from Lines 20 through 24.)

Below are some alternate routes you may have taken to get a good solution, using the same point of origin.

```
30 DRAW"C4BM78,46;F50;E50;
ND100;H50;G50"
30 DRAW"C4BM78,46;F100;H50;
E50;G100"
30 DRAW"C4BM78,46;F50;NE50;
NF50;G50"
30 DRAW"C4BM78,46;F100;
BU100;G100"
30 DRAW"C4BM78,46F100BL100
E100"
```

Note: The first three solutions are based on the five-line routine and the last two are based on the three-line routine. Did we say there was more than one way to skin a cat?

Using any of these five algorithms, or others you may have discovered, can you add a "+" shape to the X shape to create an eight-pointed star, by continuing Line 30 and using the appropriate *U, D, L,* and *R* options? Sure, you can!

These small programs afford you lots of practice fooling around with both the *LINE* and *DRAW* statements. There is method to this madness.

The idea is for the the beginner to get friendly with these two statements, so that in a future article we can tackle more complex graphics problems. Let this session be a dry run.

Here is a problem that will give you further practice. Imagine that you are using a pencil on a piece of paper, going from point to point, without lifting the pencil from the paper, and without crossing any line or back-tracking over any line, create the house in the problem below.

Here is the house, but not the solution.

```
10 PMODE 4,1:PCLS:SCREEN 1,0
20 DRAW"S32BM100,126NR6NE6
U6NF6NE3R6NH3D6"
100 GOTO 100
```

Note that the middle line was crossed, *NF6*. A mistake! Now that you know the problem, delete all the lines with *NEW*.

Use *C2* for the first three lines of the house; *C3* for the next three lines; *C4* for the balance.

Use the following format:

```
10 PMODE 3,1:PCLS:SCREEN 1,1
20 DRAW"C2S32BM120,96 (Insert
first three lines)"
30 DRAW"C3 (Insert next three
lines)"
40 DRAW"C4 (Insert rest of the
lines)"
100 GOTO 100
```

The lines inserted after the incomplete lines (20, 30 and 40) must be done using any of the eight *DRAW* directions and *N*. *B* is not allowed because all lines must be visible and continued from the point where the previous line ended. You may change the starting location, *BM120,96*.

To create a properly proportioned house, the length of the lines should be three or six.

Remember! Don't cross or go over any lines. You should have a lot of fun doing this problem.

This is the third installment of a six-part series on creating a disk mailing list program

Developing A Database Manager — Part 3

By Bill Nolan
Rainbow Contributing Editor

This article is the third in a six part series about direct access disk files and their use in database manager programs. A database manager program is a program designed to help you keep track of some related pieces of information, and the program we will be writing in this column is a specific type of database manager — a mailing list program. The principles and programming methods used to manage a mailing list can be easily applied to any type of database manager.

When complete, our mailing list will be pretty nice, having the ability to search or sort on any field. The sort method will be a fast one using a temporary directory, and the program will handle about 400 names.

The program listing included with this article will allow you to type in your names, store them on disk, and print them on the screen or printer in several formats. As will be obvious, I have written the entire program, so you can type in this part now and add the rest later without concern that this part will undergo any big changes. The menu in this program lists search and sort as options, but those sections will be added later, so don't select those options yet, or you will get a UL Error.

What we will do now is go through the listing one line at a time, with an explanation of each line. The program is written in sections, or modules, and we will look at each module as a unit.

> ***"The principles and programming methods used to manage a mailing list can be easily applied to any type of database manager."***

The first module starts on Line 10 and goes through Line 70. Line 10 clears the screen and jumps to the very end of the program, at Line 11000. Line 11000 does a *PCLEAR 1* and jumps all the way back to Line 20. This may seem a little strange, but there is a good reason for this. When you turn on your computer, it clears space for four pages of graphics, and this uses about 6000 bytes of memory. In our mailing list program we don't use any graphics, so we want to tell the computer to set aside only one page of graphics storage. (We don't need any, but there is no *PCLEAR0* command on the CoCo.) Graphics pages are located low in memory, below the BASIC program storage area, so when we start with four pages allocated and change it to one page, the entire BASIC program is relocated to a different part of memory. Some CoCos will get lost during this operation and crash out of the program. If you find that you sometimes have to type *RUN* twice with certain programs, then you have this bug. We have found that if you make the *PCLEAR 1* the last line in your program, this problem will not occur. (If we had wanted to *PCLEAR* more than four pages, we would have done it in the first line of the program.)

Line 20 clears (reserves) 15000 bytes of memory space for storage of strings. (A string is a group of alphanumeric characters, like a name or address.) Line 30 sets up three arrays for use by the program. The two big ones, ST$ and ST, will be used during the sort, and the other one will be used a lot in all parts of the program.

Line 40 does a lot of things. First, it asks for the name of the file you are going to be working with, and you can use any name you like within certain limits. The name cannot exceed eight characters in length, must start with a letter, and cannot have an extension. The only name you can't use is *"TEMP,"* because this name will be used for a

---

(Bill Nolan, who teaches "Programming In BASIC" at the college level, owns Prickly-Pear Software Co. and has written several commercially successful software packages.)

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temporary file during the sort. You can maintain more than one mailing list file on the same disk if you want to, as long as each has a different name.

After you enter the name, Line 40 goes to a subroutine at line 5500. Line 5500 opens a direct file to the disk using buffer #1, uses the name you entered (F$), and tells the computer that each record will be 99 characters long. Line 5510 is a field statement that tells the computer how the 99 characters are divided up. We have allocated 30 characters for the name, 30 for the address, 15 for the city, two for the state, nine for the ZIP code, and 13 for the phone number. Line 5520 uses the *LOF* function to find out how many records are in the file. When you open a direct access file, the computer looks on the disk in the drive to see if a file with that name exists. If it does, fine, but if there is no file by that name, the computer simply creates one, and in that case you will have a file on the disk with zero records in it. (Sort of like an empty drawer in a file cabinet.) After the computer finds out how many records are in the file, it *RETURNs* to the place where it was when the subroutine was called — in this case line 40.

Line 40 then closes the file access channel that was created in Line 5500. Remember this subroutine (at 5500), because we will be calling to it often.

Line 50 checks the value of LR (the number of records in the file), and tells you if it is a new (empty) file. The subroutine called at the end of Line 50 (at 7000) is another one you will see called fairly often. It prints the message "press any key to continue" on the screen and waits for a key to be pressed before returning. The extra *INKEY$* function call in Line 7000 is there to clear the keyboard buffer.

Line 60 checks to see how you want labels printed. This is necessary because we use only one field for the first and last names, and we want the sort to put people in alphabetical order by their last names. Because of this, you must enter names in the following format.

Contrary, Mary
Doe, Jack A.
Smith M.D., Dr. Richard M.
Anderson's Radio Shack

As you can see, the names are typed in with the last name (and any degrees, etc.) first, followed by a comma, and then the first and middle names. Business names are entered without any commas in them. This will result in the proper alphabetical order, but we want Aunt Mary's Christmas card to be addressed to Mary Contrary, not Contrary, Mary, so Lines 60 and 70 find out how you want the labels printed (last name first or first name first) and sets the variable LC to be equal to 1) if you want last name first and 2) if you want first name first. As in all cases like this in the program, the computer checks to see if you pressed one of the proper keys and ignores improper responses.

The next main section of the program is located starting at Line 500 and running to Line 580. This section prints a menu on the screen and gets the user's choice from the five options. Line 580 then branches to one of the five subsections of the program. These are located starting at Line 1000 (add a record), Line 2000 (sort records), Line 3000 (search records), Line 4000 (print records), and Line 10000 (end program).

> ***"Once you know how to . . . [make modifications] . . .you should be able to write a data-base manager to store any kind of data you like."***

The end-the-program section at Line 10000 is the shortest, so let's look at that first. This clears the screen, does an unload command, and ends. The unload is a command that closes all open files to prevent data loss and possible disk problems.

The sections at Lines 2000 and 3000 are not yet included in the program. They will be covered in future articles in this series. Until then, be patient.

The section from Line 1000 to 1220 lets you add people to your file. Line 1000 finds out how many people are in the file now (what the number of the last record is), and adds one to this for the record we are going to enter. The variable LR is the number of the last record now in the file, and the variable CR (current record) is the number of the record we are about to add. Lines 1020 to 1060 get the information for the new record and store it in the array named R$.

Line 1070 is more complex. First it goes to our old friend 5500 to open the file. Then it does two other *GOSUBs* to 7100 and 7200. Let's look at these one at a time. Line 7100 *LSETs* the information stored in the array R$, using the variable names specified in the *FIELD* statements in Line 5510. This makes the information fit the specified format. If it is too long, it will be chopped off, and if it is too short, spaces will be added to the end to make it long enough. Line 7200 is the opposite. It takes the information, which has been *LSET*, and puts it back into the array R$ so we can look at it easily to see if it has been cut. This subroutine must be used while the file is open, because the information stored in the *LSET* variables disappears when you close the file.

Lines 1080 to 1110 print the *LSET* information back on the screen so you can check it, and asks you to press 'Y' or 'N' to indicate whether or not it is correct. The subroutine at 7020 gets the yes or no answer. If the information is correct, Line 1120 sends you ahead to Line 1200. Otherwise, Lines 1130 and 1140 let you change one field of your record. The subroutine at 6500 is used to select the field you want to change. When you have entered the new information, go back to Line 1070 to verify the information again. If it is still not correct, you can change another field (or the same field again). Eventually, the information will be correct and you will go on to 1200, where the *PUT* command is used to *PUT* the new record on the disk. You will then (in Lines 1210 and 1220) be asked if you have more to add, and will be sent either to the beginning of the add section at 1000, or to the main menu at 500, depending upon your answer.

The section of the program located at Line 4000 is used to print the records. This section is there for you to use now if you want to start typing in names, and we will go over it line by line next month in installment four. Then, in installment five we will add the search, and in installment six we will add the sort to complete the program. In these we will also show you where to make modifications to the program if you need to do so to fit your needs. Once you know how to . . . [make modifications]. . . you should be able to write a database manager to store any kind of data you like. See you next month.

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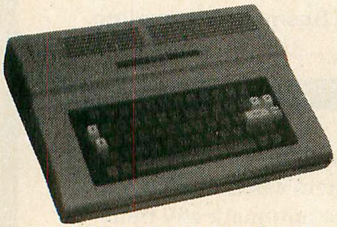
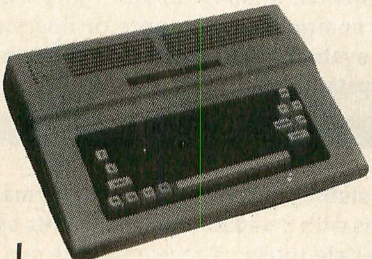
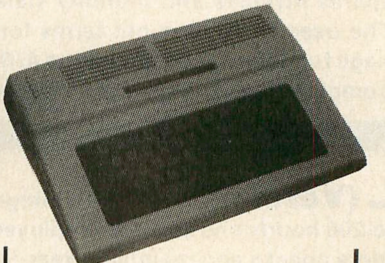
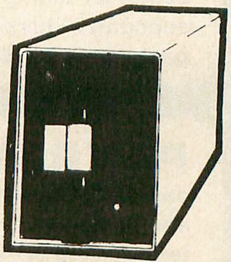
560	100
1200	185
4210	37
5150	167
END	69

The listing:

```
10 CLS:GOTO 11000
20 CLEAR 15000
30 DIM ST$(400),ST(400),R$(6)
40 PRINT:PRINT" WORK ON WHICH FI
LE?":INPUT F$:GOSUB 5500:CLOSE #
1
50 IF LR<1 THEN PRINT:PRINT" THI
S IS A NEW FILE":PRINT:PLAY"AB":
GOSUB 7000
60 CLS:PRINT:PRINT"DO YOU WANT L
BELS PRINTED:":PRINT:PRINT" 1. L
AST NAME FIRST":PRINT" 2. FIRST
NAME FIRST":PRINT:PRINT"PLEASE S
ELECT 1 OR 2":K$=INKEY$
70 K$=INKEY$:LC=VAL(K$):IF LC<1
OR LC>2 THEN 70 ELSE SOUND 150,1
500 CLS
510 PRINT:PRINT"                 MAIN
MENU":PRINT:PRINT"  1. ADD RECOR
DS"
520 PRINT:PRINT"  2. SORT RECORD
S"
530 PRINT:PRINT"  3. SEARCH RECO
RDS"
540 PRINT:PRINT"  4. PRINT RECOR
DS"
550 PRINT:PRINT"  5. END PROGRAM
"
560 PRINT:PRINT" PLEASE ENTER YO
UR CHOICE (1-5)":K$=INKEY$
570 K$=INKEY$:K=VAL(K$):IF K<1 O
R K>5 THEN 570 ELSE SOUND 150,1
580 ON K GOTO 1000,2000,3000,400
0,10000
1000 CLS:GOSUB 5500:CLOSE #1:CR=
LR+1:PRINT"  YOU ARE ADDING RECO
RD #";CR:PRINT"  TO THE FILE ";F
$
1010 PRINT:PRINT"NAME (LAST NAME
, FIRST NAME)?":LINE INPUT R$(1)
1020 PRINT:PRINT"ADDRESS?":LINE
INPUT R$(2)
1030 PRINT:INPUT"CITY?     ";R$(3)
1040 PRINT:INPUT"STATE CODE?    "
```

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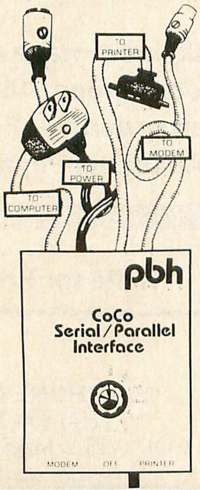

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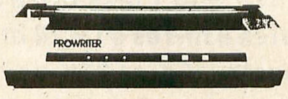

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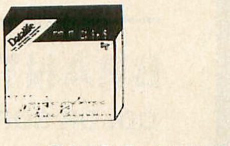

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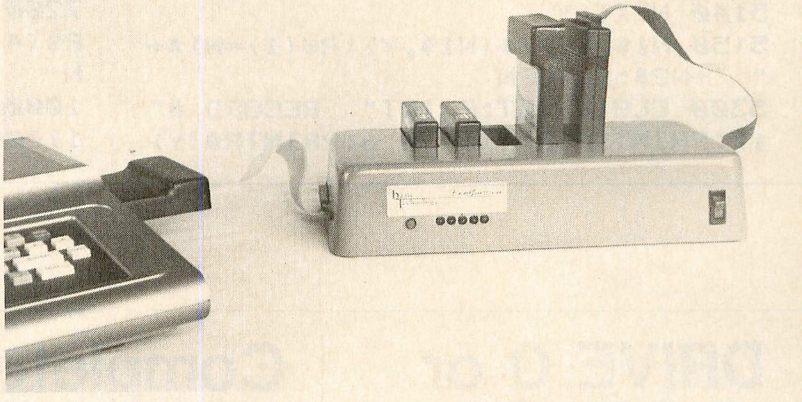
```
;R$(4)
1050 PRINT:INPUT"ZIP CODE?   ";R
$(5)
1060 PRINT:INPUT"PHONE #?    ";R$
(6)
1070 GOSUB 5500:GOSUB 7100:GOSUB
 7200
1080 CLS:FOR X=1 TO 6
1090 PRINT:PRINTR$(X)
1100 NEXT X
1110 PRINT:GOSUB 7020
1120 IF K$="Y" THEN 1200
1130 CLOSE #1:CLS:PRINT:PRINT" F
IELD TO CHANGE?":GOSUB 6500
1140 CLS:PRINT:PRINT" OLD DATA I
S:":PRINTR$(CF):PRINT:PRINT" ENT
ER NEW DATA:":LINE INPUT R$(CF):
GOTO 1070
1200 PUT #1,CR:CLOSE #1:CLS
1210 PRINT:PRINT" WANT TO ADD MO
RE? (Y/N)":K$=INKEY$:GOSUB 7030
1220 IF K$="Y" THEN 1000 ELSE 50
0
4000 CLS:PRINT:PRINT" PRINT ALL
RECORDS SECTION"
4010 PRINT:PRINT"  1. PRINT ON S
CREEN":PRINT"  2. PRINT ON PRINT
ER":PRINT"  3. PRINT ON LABELS":
PRINT"  4. PRINT PHONE # LIST":P
RINT"  5. RETURN TO MAIN MENU":P
RINT:PRINT"  PRESS A NUMBER (1-5
)":K$=INKEY$
4020 K$=INKEY$:PO=VAL(K$):IF PO<
1 OR PO>5 THEN 4020 ELSE SOUND 1
50,1
4030 ON PO GOTO 4100,4200,4100,4
300,500
4100 GOSUB 5500:CLS:IF PO=3 THEN
 PLAY "CDEF":PRINT" MAKE SURE PR
INTER AND LABELS    ARE SET UP A
ND ON LINE":GOSUB 7050
4110 FOR X=1 TO LR:GET #1,X:GOSU
B 7200
4120 IF PO=1 THEN GOSUB 5300 ELS
E GOSUB 5000
4130 NEXT X
4140 CLOSE #1:GOTO 4000
4200 GOSUB 5500:PLAY"CDEF":PRINT
" MAKE SURE PRINTER IS ON LINE":
GOSUB 7050
4210 FOR X=1 TO LR:GET #1,X:GOSU
B 7200
4220 PRINT#-2,R$(1);"  ";R$(2):P
RINT#-2,R$(3);"  ";R$(4);"  ";R$
```



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```
(5);"  ";R$(6):PRINT#-2,""
4230 NEXT X
4240 CLOSE #1:GOTO 4000
4300 GOSUB 5500:PLAY"CDEF":PRINT
" MAKE SURE PRINTER IS ON LINE":
GOSUB 7050
4310 FOR X=1 TO LR:GET #1,X:GOSU
B 7200
4320 PRINT#-2,R$(1);"    ";R$(6)
4330 NEXT X
4340 CLOSE #1:GOTO 4000
5000 FL=1:IF LC=2 THEN GOSUB 510
0
5010 FOR Y=LEN(R$(3)) TO 1 STEP
-1
5020 IF MID$(R$(3),Y,1)<>" " THE
N 5040
5030 NEXT Y
5040 R$(3)=LEFT$(R$(3),Y)
5050 PRINT#-2,R$(1):PRINT#-2,R$(
2):PRINT#-2,R$(3);", ";R$(4);"
";R$(5)
5060 FOR Y=1 TO 3:PRINT#-2,"":NE
XT Y:RETURN
5100 P=INSTR(1,R$(1),","):IF P=0
 THEN RETURN
5110 N1$=RIGHT$(R$(1),30-(P+1)):
N2$=LEFT$(R$(1),P-1)
5120 FOR Y=LEN(N1$) TO 1 STEP -1
5130 IF MID$(N1$,Y,1)<>" " THEN
5150
5140 NEXT Y
5150 N1$=LEFT$(N1$,Y):R$(1)=N1$+
" "+N2$:RETURN
5300 CLS:PRINT:PRINT"  RECORD #"
;X:PRINT:FOR Y=1 TO 6:PRINTR$(Y)
:NEXT Y:PRINT:GOSUB 7000:RETURN
5400 FL=1:FOR Y=1 TO 6:PRINT R$(
Y):NEXT Y:PRINT:RETURN
5500 OPEN"D",#1,F$,99
5510 FIELD #1,30 AS N$,30 AS A$,
15 AS C$,2 AS S$,9 AS Z$,13 AS P
$
5520 LR=LOF(1):RETURN
6500 PRINT:PRINT" 1. NAME":PRINT
" 2. ADDRESS":PRINT" 3. CITY":PR
INT" 4. STATE":PRINT" 5. ZIP COD
E":PRINT" 6. PHONE #":PRINT
6510 PRINT" PRESS A NUMBER (1-6)
":K$=INKEY$
6520 K$=INKEY$:CF=VAL(K$):IF CF<
1 OR CF>6 THEN 6520 ELSE SOUND 1
50,1:RETURN
7000 K$=INKEY$:PRINT"   PRESS AN
Y KEY TO CONTINUE"
7010 IF INKEY$="" THEN 7010 ELSE
 SOUND 150,1:RETURN
7020 PRINT" IS THIS CORRECT? (Y/
N)":K$=INKEY$
7030 K$=INKEY$:IF K$<>"Y" AND K$
<>"N" THEN 7030 ELSE SOUND 150,1
:RETURN
7050 FOR X=1 TO 2000:NEXT X:RETU
RN
7100 LSET N$=R$(1):LSET A$=R$(2)
:LSET C$=R$(3):LSET S$=R$(4):LSE
T Z$=R$(5):LSET P$=R$(6):RETURN
7200 R$(1)=N$:R$(2)=A$:R$(3)=C$:
R$(4)=S$:R$(5)=Z$:R$(6)=P$:RETUR
N
10000 CLS:UNLOAD:END
11000 PCLEAR1:GOTO 20
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Opposing Views On Computers In Education

By Michael Plog, Ph.D.
Rainbow Contributing Editor

Remember the old physics class, where they explained action and reaction? Well, reaction applies to social situations also. For those of us old enough to remember the 1960s, we lived through the reaction to the Vietnam War. Most politicians are elected as a result of a reaction against some policy or image of policy. There are reactions against computers also.

I should make the standard editorial disclaimer right now. THE RAINBOW allows me to write what I want. My comments are my own, and do not necessarily reflect the views of the magazine. On a more personal note, let me emphasize that no one on THE RAINBOW staff has ever tried to control what I write, or even make changes in my copy beyond normal proofing and editing. So, as you read the rest of this article, remember that the thoughts are mine; not necessarily THE RAINBOW's.

A particular reaction against computers in education has come to my attention lately. There is an organization called the "National Anti-Drug Coalition." This group says computers are turning students into "zombies." They also claim computerization in schools will result in teacher layoffs, depersonalization of schools, and a teaching style of "drill and grill."

> ***"It is true that the role of the teacher may change in the future. That should not be surprising."***

A few years ago, this group reportedly tried to stop the Baltimore city schools from instituting a computer plan in the city's 140 elementary schools, 27 junior high schools, and 20 high schools. The Anti-Drug Coalition said computers would dehumanize teaching and turn the children of Baltimore into robots. The thwarting efforts were unsuccessful; Baltimore now has 400 microcomputers for its 120,000 students.

There may be other cities and school districts where the Anti-Drug Coalition is working. If so, I can only sympathize with the school officials. It is not easy to put up with people who use emotion instead of reason; prefer witch hunts to quests for enlightenment.

Now just who is this coalition? The organization was founded in 1976 by Lyndon LaRouche. I have had the opportunity to see Mr. LaRouche on television. Late one night, a strange advertisement came on. This was LaRouche, running for president. In the past, he has run for president on the U.S. Labor Party ticket, and this year is running as a Democrat. At the time I first saw the advertisement, I considered his view of the Soviet Union to be childish and his interpretation of factual material to be distorted. Thus, even before I ever heard of this coalition, I knew I had a philosophical difference with the coalition founder.

I am sure Mr. LaRouche feels himself to be sincere. He probably is a kind husband and parent, and maybe owns a loyal pet. But his perception of reality differs greatly from mine. And even though he may be extreme in his views, and just wild enough to get into controversy with his lack of information, there are other people who also question the use of computers in schools. Well, let's consider some of the arguments *against* the use of computers in education.

(Michael Plog received his Ph.D. degree from the University of Illinois. He has taught social studies in high school, worked in a central office of a school district, and currently is employed at the Illinois State Board of Education.)

The concept of turning students into zombies and robots is difficult to argue against. The statement has metaphysical tones, not factual. The concept of turning students into mindless actors in a play, written by evil scientists, is like telling a Christian that Judas was the only good disciple. Some statements are simply outside the mental framework we use to filter information about the world. There may be more here than meets the eye, however.

I have heard of (but not examined) some research that shows a drop in creativity when students are working on computers. Assume for a moment that a competent research study actually determined that. There are a host of questions, such as how creativity was measured, etc. Even beyond that, let's accept the finding as legitimate. Given the state of the art of educational software, I can easily accept that drill and practice programs lessen creativity. Drill and practice in any form will not inspire students. Such activities are necessary in schooling, but are not sufficient as the total outcome of education.

If, instead of drill and practice, students are assigned a problem to solve, and given a computer as one of the tools available to them, I would be surprised if a measure of creativity did not increase. For example, students can learn how to use a spreadsheet package, and then be given a problem to solve. Part of the solution will involve calculations on the spreadsheet. This is a type of activity that can stimulate creativity on the part of the student. (And possibly on the part of the teacher as well.)

Next, consider that computerization will eliminate the need for teachers. Past articles have mentioned this position, so there will not be much time spent on it here. Education (of anyone, not just children) requires judgments by someone. A computer cannot make judgments. The act of forming a judgment involves a value position. Computers are logical, they are not reasonable. Training for a specific skill, such as typing, disk repair, or using a band saw, can be accomplished with a computer. Education is more than training. The lower level thought processes are necessary to education, but are not sufficient. Higher level mental activities, such as analysis, synthesis, and evaluation, are also necessary for education.

It is true that the role of the teacher may change in the future. That should not be surprising; the role of the teacher has changed significantly in the past 50 years. The next 50 years will see even greater changes. The technology of microcomputers will see even greater changes. The technology of microcomputers will contribute only a small amount of that change.

What about depersonalization of schools? There are many people — including educators — that claim schools are already depersonalized. Arguments are made every day that schools do not meet the need's of students or society. The computer is an easy scapegoat for this argument. Frankly, I find it hard to believe that a student working on a microcomputer will be less involved with humans. First, students have to share time on computers. Beyond that, computer use in schools causes questions for students. The first question is naturally, "How do I turn on this thing?" The questions get more complicated. By peer interaction, as well as teacher interaction, students will be dealing with humans to solve problems. (That sounds like education to me.)

"The crux of the whole matter is that computers should be used as one tool available to teachers."

The term "drill and grill" is cute. Stupid, but cute. It is true that much of educational software is drill and practice. It is unfortunate, but some people believe that such software is the maximum capability of computers. Such a view is extremely shortsighted. Everything evolves, including curriculum and skills of programs. During the early phases of educational computing, it is expected that software be crude and elementary. With the growth of the field, the sophistication of programs will increase. This sophistication means more than flashy software. Other skills (such as explanation) can be taught with the help of a computer. We have already seen a tremendous growth in educational software; future growth is almost certain.

The crux of the whole matter is that computers should be used as one tool available to teachers. The microcomputer cannot become the only tool; indeed it is not the most important tool. The computer is only one of many tools teachers should use to educate children.

Let us back up for a moment, and consider why we should even talk about the arguments of Mr. LaRouche. After all, it is easy to shoot holes in positions of people who have failed to consider all the important elements of a position. Is it not a cheap shot and waste of time to deal with the coalition? Not entirely. If we are capable of responding to the extreme fringe, we will be capable of responding to intelligent, real arguments. These concerns are shared by well-meaning, reasonable people, who can express their views in more realistic terms. It is understood that anyone reading this magazine is already "sold" on computers. Other people, however, do not share our enthusiasm. They are not all vicious or stupid; they simply have not experienced the benefits of computers in the educational process. Their questions are legitimate and deserve responses.

There is not time to go into all the arguments against computers and questions about their use, but one position deserves mention. There is a concept of "readiness" in education. In essence, this means that children will learn more efficiently if they are ready for the material. This involves two components. The first is enough background knowledge. (We should not expect children to read, for example, until they know the letters of the alphabet.) The second component is a state of mind. Learning will be more efficient once the need for knowledge is experienced. The concept of readiness can also apply to institutions and societies. Schools and school people may lack some of the background knowledge and mental attitudes to efficiently use computers in education. Allow me to give you a personal example of readiness. I came home from work recently, and my wife jokingly informed me she was mad at me. She wanted to know why I had not taught her to use the word processor on our Color Computer. She has achieved readiness! Well, school people will need to achieve readiness about computers also. By having the machines available, readiness will not have to wait on purchase orders and delays of bureaucratic decisions.

That is all for this month. I welcome any comments you may have. My address is 829 Evergreen, Chatham, IL 62629.

BYTE MASTER

16K ECB

First, eat all your binary peas, then you'll get a 'most significant byte' of assembly language meat.

School Days, School Days

By R. Bartly Betts
Rainbow Contributing Editor
with Programs by Chris Bone

I'll bet you thought that writing in assembly was going to be fun. Instead you have been doing so many base conversions that you now eat your peas in binary and use 16 dollar bills to buy computer parts.

Well, take heart. Your perseverance is going to be rewarded. You'll get your teeth into some assembly language meat today. You'll be taking a "most significant byte," you might say. Before this column is over, you will be writing your first assembly language program, if you haven't already tried. I hope that you have your editor/assembler and are all ready to go.

(Bartly Betts is a former reporter and magazine editor now operating a retail store and custom leather shop in Brooks, Alberta, Canada. He has owned and operated a Color Computer for over three years and is presently taking an electronics and computer course by correspondence. Chris Bone is a college computer science major and has been programming for more than three years. He averages between six and nine hours a day on the CoCo.)

Reading And 'Riting And . . .

The first thing to learn is how to read assembly language source listings. Although you will soon be learning to write your own, it is extremely helpful to be able to study the work of others. I remember when I first became interested and searched long and hard just to find out what to do with the source listings. I didn't have an editor/assembler program and didn't know I needed one.

A source listing in assembly language is much the same as a BASIC program listing. It is simply the step-by-step procedure for accomplishing a task on your computer. In itself, it would mean nothing to your computer's central processing unit (CPU). The source code must be assembled and turned into machine language instructions. That machine language, to a CPU, is like honey to the black bear's nose. (It gets the beast running.)

Although the purpose of a source listing is similar to a BASIC listing, there are also several differences. For one thing, a source listing may or may not have line numbers. They will be used on *EDTASM+* for your convenience but line numbers have no bearing on the actual program.

A source listing will include only one instruction per line. In BASIC you may enter *PRINT "HELLO"*, but in assembly language you may have to clear a register, load a series of memory locations with the numeric codes for H,E,L,L, and O. Then you will load the register one letter code at a time and store the code in the text screen memory. As you can see, when I say one step at a time, I mean one step at a time. The reason for this is that the machine language code for printing to the screen is already built into your BASIC ROM. In assembly language you have to build each routine to suit your specific purpose. (In some cases, you can use ROM

> ***"Before this column is over, you will be writing your first assembly language program, if you haven't already tried."***

routines, but we will deal with that in another column.) Assembly language listings are also set up in columns. The number of columns can differ however, as some are essential to the assembler and others are not. The possible columns are: Memory Location, Object Code, Line Numbers, Label Field, Operation Code, Operand or Address Field, and the Comment Field. Although the listings do not have to be organized this way, it is the standard. The listing below is organized under all the possible columns. It is a short program that will quickly reverse all the characters on the text screen.

```
MEMORY  OBJECT   LINE   LABEL  OP CODE OR  OPERAND OR  COMMENT
LOC.    CODE     #'S    FIELD  MNEMONIC    ADDRESS     FIELD
(XX)    (XX)     (XX)          FIELD       FIELD       (XX)
-----------------------------------------------------------------------
3FF0             00100         ORG         $3FF0       BEGIN LOC OF PROG
3FF0    8E 0400  00110  START  LDX         #$400       FIRST TEXT SCRN LOC
3FF3    A6 84    00120  LOOP   LDA         ,X          LOAD FIRST BYTE
3FF5    88 40    00130         EORA        #$40        REVERSE BYTE
3FF7    A7 80    00140         STA         ,X+         RETURN BYTE TO SCRN
3FF9    8C 0600  00150         CMPX        #$600       IS IT END OF SCRN?
3FFC    26 F5    00160         BNE         LOOP        NO? GET NEXT BYTE
3FFE    39       00170         RTS                     RETURN TO CALL PROG
           000                 END                     THAT'S ALL
```

You will note that I have put (XX), for optional, under those columns that need not be included in a source listing. They are the columns that are for your reference and are not needed by the assembler. When you see listings in books and magazines, you may see any or all of these (XX) columns left out. Also, a listing seldom includes column headings, but you will soon learn to recognize which column is which.

Dig Right In

Now for some practical experience. As the honey bee said to the black bear, "you'll get the point quicker if you dig right in." First, plug in your *EDTASM+* cartridge or load the program from disk. If you're using a different editor/assembler, I'm afraid you'll have to study the manual and adapt your procedure accordingly.

When the program is up and running you will see a "*" on the screen. Press I and ENTER. The I is for input and tells *EDTASM+* that you are ready to type in a listing. The program provides auto line numbering for reference and editing convenience. You will see 00100 on the left of the screen, followed by a blinking cursor. Column positioning is critical in assembly language programs, but *EDTASM+* will automatically handle that problem. As there is no label entry in the first line, simply press the right arrow key. The cursor will jump to the next column. There type in *ORG*. Press the right arrow again. Now type in *$3FF0*. You do not need to type in the comment field but let's do it for experience. Press the right arrow again and type in the comment *BEGIN LOC OF PROG*. Now just press ENTER. Your line number is automatically incremented and you are ready to start on the second line. You will note that we have done nothing with the first two columns of the sample listing. The first column, the memory addresses, will relate to the value given to *ORG* in Line 00100. In the case above, the program will begin loading at Hex 3FF0 and will increment from there. The object code is the actual machine language that will be produced when the program is assembled. It can't become a part of the listing until assembly takes place.

Now, type in the remaining lines as per the above procedure. If you want to skip the comment field, press ENTER instead of the right arow when finished in the Operand or Address Field.

Will The Assembly Come To Order

When you have finished the last line, press the BREAK key to return to the command mode. Again you will be presented with "*". Type in *P#* and press ENTER. This will take you back to the top of the listing. Now press the down arrow to see each line in order. Check it carefully. If there is any error, type in 'E' followed by the line number. This will put you into the Edit mode and you can make changes the same as in BASIC. Press ENTER when finished and use the down arrow to continue your check. If you are having any trouble, refer to your editor/assembler manual.

The first thing to do when your program is completed is to save it on disk or tape. This is a precaution in case something should go dreadfully wrong in future stages. In the command mode press 'W' and ENTER. You will be asked for a filename. Type *REVERSE/SOR* for disk *EDTASM+* or *REVERSE* for the cartridge version and press ENTER.

Until now you have been doing most of the work. It is time for the computer to do its share. To assemble the program in memory, type *A/IM/WE/AO* and press ENTER. The listing will slide by on the screen. If there are any errors that the computer can catch, however, it will stop at the line which contains the error. Make a note of the line number and press ENTER. When the assembly is completed, you can go back and edit the line. Then repeat the assembly procedure. If you make changes, be sure to save the source code again.

When there are no errors, save the machine language program to tape or disk. To do this you will actually assemble it a second time to tape or disk storage. Type *A/AO* and press ENTER. You will be asked for a filename. Type *REVERSE/BIN* or *REVERSE* and press ENTER. When the new assembly is complete, type 'Q' and ENTER to exit the editor/assembler.

Better Than A Kiss

Listing 1 is a simple BASIC program that will demonstrate your new machine language program. Type in the BASIC program, then *LOADM"REVERSE"*. Type *RUN* and press ENTER. Use the clear key to toggle your reverse program. That's better than your first kiss, right? Perhaps, you would like to compare the result with a BASIC program, just to see if you have acccomplished anything. Type in Listing 2 and *RUN* it. It does the same job, only in BASIC. If you don't see the difference, then try and forget about that first kiss and look again.

Homework

Your assignment for next month. In order to move along, you are going to have to do some homework. Hopefully you are enthused enough that you want to do homework. Listing 3 is a neat routine that hooks into your computer's BASIC ROM and adds three slick features. Enter and assemble Listing 3 as

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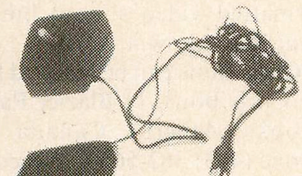

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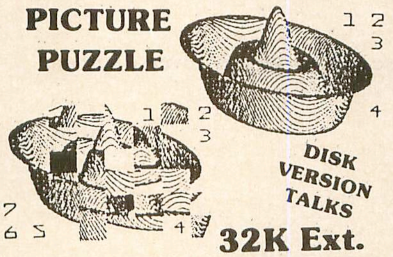

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we have already discussed. When you have the machine language code saved to tape or disk, load it into the computer memory and type *EXEC &HE00* and press ENTER. You will see no change on the screen but the "OK" prompt should reappear along with the blinking cursor. Do not *EXEC* more than once. The features you have added to your ROM are a "clear to end of line," "clear to end of screen," and "clear screen." Here is what they do:

1) Clear to end of line: Often in a BASIC program I want to have several inputs take place in the same video line. I do this with a *PRINT@* command, followed by a semicolon and then the input command. Sometimes old text is left as garbage on the screen. With this new feature you could program a line like *100 PRINT@65,CHR$(31);: INPUT A$. CHR$(31)@* will clear the video line from location 65 to the right edge of the screen, location 96, but will leave the rest of the screen alone.

2) Clear to end of screen: This function works the same as the one above except that the screen would be cleared from the *PRINT@* location to the bottom of the video screen.

3) Clear entire screen: This function works the same as the *CLS* command except it allows you to add the command to a string. An example would be *100 A$=CHR$(29)+"HELLO":PRINT A$*. In this example, *CHR$(29)* would be tacked onto the front of A$. Everytime you *PRINT A$*, the screen will be totally cleared and "HELLO" will be printed at the top, left hand corner. You could also use the *PRINT@* command to position the text.

Your second assignment is to study your editor/assembler manual. Although we went through the entering of an assembly language program step by step, in the future I will assume that you know how to make it work so we can spend our time learning assembly language programming.

Thus far I have told you little about how assembly language programs work. That will start next month. You now know what an assembly language listing looks like, what it is for and what you can do with it. You have had practice writing them and assembling them. Now you will be ready to begin understanding them. Listing 3 is provided to give you a taste of some of the features that will be built into the program I promised in the first column . . . a program that will give you a 51-character by 24-line screen. It will also include the functions provided in Listing 3. In a few months, you will not only have a super machine language program to give you more BASIC functions and a reasonably formatted video screen, but you will understand how it works.

Chris Bone can be reached by writing to: Chris Bone, 11 Blazier Park Street, Brooks, Alberta, Canada T0J 0J0, phone (403) 362-5650. (No collect calls please.)

Listing 1:

Use with sample program to reverse screen by pressing the CLEAR key.

```
10 DEFUSR0=&H3FF0
20 IFINKEY$<>CHR$(12)THEN20
30 A=USR0(0)
40 GOTO20
```

Listing 2:

BASIC version of screen reverse program. Use CLEAR key to reverse screen.

```
10 FORX=&H400 TO&H5FF
20 A=PEEK(X)
30 IFA>63THENA=A-64ELSEA=A+64
40 POKEX,A:NEXT
```

Listing 3:

Add three *CHR$* controls for video screen handling.

CHR$(29) clears screen, *CHR$(30)* clears from cursor to end of screen, *CHR$(30* clears from cursor to end of video

```
00010        ORG   $6000
00020 START  LDX   $168      *GET RAM PRINT HOOK
00030        LDD   #GO       *GET OUR NEW ROUTINE ADDRESS
00040        STD   $168      *LINK IT TO THE PRINT HOOK
00050        STX   RETURN+1  *PUT OLD HOOK AT END OF OUR NEW ROUTINE
00060        RTS             *GO BACK TO BASIC
00070 GO     PSHS  X         *SAVE X
00080        LDX   $68       *GET CURRENT LINE #
00090        CMPX  #$FFFF    *IF LINE=FFFF WE ARE IN IMMEDIATE MODE
00100        PULS  X         *GET OLD X (CC PRESERVED)
00110        BEQ   RETURN    *IF IT WAS IMMEDIATE GOTO OLD HOOK
00120        CMPA  #$1D      *CHR$(29)?
00130        BNE   NOTCLS    *IF NOT GOTO NEXT TEST
00140        PSHS  X,B       *SAVE X AND B
00150        JSR   $A928     *GOTO ROM CLS
00160        PULS  X,B       *GET SAVED X AND B
00170        BRA   RETURN    *JUMP TO OLD HOOK
00180 NOTCLS CMPA  #$1E      *CHR$(30)?
00190        BNE   NOCLSE    *IF NOT GOTO NEXT TEST
00200        PSHS  X,B       *SAVE X AND B
00210        LDX   $88       *$88=CURRENT CURSOR LOC
00220        LDB   #$60      *CODE FOR SPACE
00230        JSR   $A92F     *PORTION OF CLS IN ROM
00240        PULS  B,X       *GET SAVED X AND B
00250        BRA   RETURN    *JUMP TO OLD HOOK
00260 NOCLSE CMPA  #$1F      *CHR$(31)?
00270        BNE   RETURN    *IF NOT WE ARE DONE
00280        PSHS  X,B,A     *SAVE X,B AND A
00290        LDD   $88       *GET CURRENT CURSOR LOC
00300        ORB   #$1F      *CALCULATE END OF LINE
00310        TFR   D,X       *PUT END OF LINE==>X
00320        LEAX  1,X       *POINT TO START OF NEXT LINE
00330        LDB   #$60      *CODE FOR SPACE
00340 LOOP   STB   ,-X       *X=X-1 THEN POKE X,B
00350        CMPX  $88       *ARE WE @ THE CURSOR
00360        BNE   LOOP      *IF NOT POKE AGAIN
00370        PULS  A,B,X     *GET OLD X,B, AND A
00380 RETURN JMP   $1000     *RETURN TO NORMAL PRINT ROUTINE
00390        END
```

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Creating the Rainbow Checkbook

Here's both the beginning of a checkbook balancer and a glimpse into how program logic evolves into working software

By Richard White
Rainbow Contributing Editor

My left ear itched the other day. That means someone else had started to write the world's most prolific program, one to balance a checkbook. Now my left ear hasn't itched for three days. Does this mean we have enough programs to balance a checkbook? No way! The world's greatest checkbook program has not yet been written. Even the one I use does not come close. I can see a stack of five bank statements on the table that have not been reconciled to my checkbook balance. But I did not write my program to do that. Perhaps a little rewriting is in order.

The first thing was to get a listing and refresh my memory on how the program was written. The program was written three years ago when I was still struggling to learn BASIC without a printer. This was the program that was to be well organized. It was — sort of. At least it was mostly top-down. But, I started the file routines at Line 850 and once they were written, I started the edit routine at 700. The edit routine turned into a monster and I reached Line 800 only about half done. The only choice was to come to a somewhat logical break in the code and *GOTO 1020* to finish it.

The program did the job I wanted in spite of a few annoyances which I learned to live with. When the disk drive arrived, I changed the file statements to put the files to disk rather than tape and continued. It's a little quicker to *LOAD* and *RUN*, but it never was a serious pain on tape.

So, now in mid-1984 what should I do? Start over? I probably won't salvage much code from the old program, but it will influence the new program. Those features I like will be kept and maybe improved. The things I miss will be added. The things that are awkward will be redone. I will write a blow-by-blow account for you to outline the steps one poor soul goes through to write a finished BASIC program. Of course, you will get some explained examples of BASIC code. But more important should be a glimpse or more into how program logic is evolved and converted into a running program.

It all starts with some thinking and some pencil work. Those who have followed me for a while know I put great value in dividing a program into functional modules and assigning each module a block of line numbers starting at an even hundred preferably. Subroutines that are frequently used go at the front of the program, while others go at the end of their functional number block or at the very end of the program. The main menu goes at Line 100 or 1000 so we can easily remember which line to *GOTO* to resume in event of a *BREAK* or *ERROR*. This is valuable while writing a program particularly during testing and trouble shooting.

The important thing in starting a program is to plan it well enough so you can define modules and assign space. If the subroutines are placed in the front of the program using line spacing of two or even one after revisions, you can count on keeping your modules to 100 line blocks. Line spacing of 10 goes out with the dishwater in some cases.

The first thing to do is to put some ideas down on paper or into your word processor where you can easily change things. At this point we are trying to build concepts that can trigger other ideas. Try designing some menus. This makes you think about what needs to be on a menu. It helps organize thoughts. One thought that occurred to me was, why have a main menu for this program? Menus are but one way to make a program go. If needed prompts can be

(Richard White has a long background with microcomputers and specializes in BASIC programming. With Don Dollberg, he is the author of the TIMS data base management program.)

included on the work screen, so much the better. But, if there is no main menu, where does one *GOTO* to resume the program without data loss if the program is broken. It is particularly handy to be able to do this during debugging or if the BREAK or CLEAR key is hit in error. If there is no main menu, then there needs to be a main work screen that will serve the same purpose, a design detail to keep in mind for later.

After a week or two of cogitating and penciling around, there comes the time when the first cut program objectives or functional specification can be written. These will provide some clear direction even if it is back to the drawing boards. Below is the second cut at functional specifications for *Rainbow Checkbook*. There may be a third, but I feel pretty good about these now. Partly, this is because I have written part of the program and see more clearly how these specs will be satisfied.

Rainbow Checkbook
Functional Specifications

1) Be able to enter, edit and save checkbook entries.

2) Be able to scroll up or down through the file using the arrow keys.

3) Make needed functions available from the appropriate work screen without exiting to a menu.

4) Be able to edit a record, delete it or insert a new record.

5) Have a routine to start a new file from scratch.

6) Be able to strip cleared items from the current file to an archive file after reconciliation with the bank statement.

7) Calculate a bank balance based on cleared items only for comparision with the balance on the bank statement. Corrections to cleared items must update the calculated bank balance. The calculated balance should duplicate that on the bank statement when all items are correctly entered and cleared.

8) Print a hardcopy report showing all cleared transactions and a bank balance reconciliation. This will include summations of deposits, adjustments and checks. Adjustments will include all non-deposit and non-check transactions, including account charges, interest earned and check charges.

9) Support cassette and disk files.

10) Operate in a 16K Extended or Disk BASIC machine.

A few refinements of your functional specification and you will be ready to outline the basic structure of the program. Generally you will be able to fit the code you need within blocks of 100 lines, but perhaps not with line spacing of 10. You won't need to if you use a full-screen editing program like *Colorkit* from Prickly Pear Software that lets you copy a line to another place in the program and then either keep or delete the original. I use it more for copying and editing a line that is to be used again elsewhere with only minor changes. I could use it for reorganizing lines in a module if space got tight. Another use is to work-up and debug lines in the module being developed and then move these lines intact into the subroutine area for use by other modules. Sure you could leave such lines in one module and call them from another. But, it is much easier to remember where they are or where to start looking if all subroutines used by more than one module are together.

Lines	**Function**
1-9	Most frequently used subroutines
10-99	Other subroutines
100-199	Enter items
200-299	Edit records and update balances
400-499	Strip cleared items to make updated current file
600-699	Print report
900-999	Tape and disk I/O
2000-2099	Initialization
2100-2199	Make new file
10000	Save program routine
10100	*PCLEAR 1* routine

When you start a program, you don't really know what the finished product will be. A case in point is the new file routine starting at 2100. Will this be substantially different than the code to enter new items in an existing file starting at 100? On the basis that each file had to have started from scratch at some time, I wrote this section and its subroutines first. I expected that the subroutines would be used for the 100 block code as well. The real question is, will the 2100 block code end up as only a limited version of the 100 block code? If so then it will go and not be missed. Since it served as a test bed for developing all the subroutines developed to date, effort spent on it has not been wasted.

First we must get the program initialized before we can think about generating a file.

```
0 GOTO10100
10100 PCLEAR1:GOTO2000
2000 CLEAR3763:DIMA$(142),A(142,1)
2050 RC$="RAINBOW CHECKBOOK":SS$="##,###
    .##":
    SN$=%           % NOTE:":CR=1:LR=1:
    IS$="DAVCESLNB+CHR$(10):S4$="%   %":
    CS$="OUTSTD":A$(0)=" $ $ $FIRST ENTRY
    BELOW"
```

Above we see the lines of the program in the order they execute when the program is *RUN*, thanks to the *Telewriter*. Line 10100 is the last line of the program and contains the *PCLEAR 1* beating a bug in the Extended BASIC 1.0 ROM. In Line 2000, we clear 3763 bytes for string space and dimension a string array, *A$(142)*, and a two dimension numeric array, *A(142,1)* to hold data for 142 entries. And how did I arrive at those numbers? Magic, maybe? Perhaps they were in the second sealed envelope in the bird house behind the post office in Prospect, Ky. Fortunately, there is a bit of logic involved.

The program is to run in a worst case machine, a 16K model with a disk drive. The end of the lower RAM used by the disk is 3584. There are 1536 bytes used by one page of graphics memory, so the first 5120 bytes are allocated. Since we only have 16383 bytes of RAM, this leaves 11263 bytes free. I assumed the program would run 5000 bytes and allowed 363 bytes for the stack and general variable tables to leave 5900 bytes for string memory and the array variable tables. The question is how best to allocate this.

The next assumption is that each record will average 25 bytes in the string array member, use 10 bytes in the numeric array and have a five-byte entry in the string variable table for a total of 40 bytes per item. Now I want to leave 200 bytes in string space for general program operation, which leaves 5700 bytes to allocate. The amount in string space must be 5700*(25/40) which equals 3563. Add the 200 to this and we *need to* CLEAR 3763. The number, 3563/25 gives the amount of records this will support, 142. That would cover four months of check writing for me. If you have a 32K or 64K machine, recalculate assuming 32K total RAM space in BASIC. Even better would be to write a routine to automatically apportion memory based on available machine memory. Maybe later if I can keep the length of the program near the 5000-byte mark.

In Line 2050 we initialize various variables and define strings for *PRINTUSING* and headings. This line will grow some as the rest of the program is written.

```
2100 CLS:PRINT@8,RC$:PRINT@42,“RICHARD
WHITE”:PRINT@76,“(C) 1984”:PRINT@200,“lOAD
FILE”:PRINT@264,“nEW FILE”:PRINT@328,“”;:GO
SUB1
2110 IFI$=“L”THEN950ELSEIFI$<>“N”THEN2110
```

Line 2100 prints the entry menu with options to load a file or start a new file. I expect the computer to be in the uppercase mode, but use a reverse video or lowercase ‘l’ and ‘n’ to signal the keystroke to choose between options. The program accepts only an ‘L’ or ‘N’. Otherwise, it returns to 2110 avoiding a possible error. An *INKEY$* routine, *GOSUB1,* is used to get that keystroke.

```
1 PRINTCHR$(191);:I$=INKEY$:IF$=“”THENFOR
X=0TO5:
NEXT:PRINTCHR$(8);:GOTO1ELSEPRINTCHR$(8)
;:RETURN
```

Normally, there is no cursor while *INKEY$* is waiting for an input. This is no problem on a simple choice screen like *lOAD* or *nEW*. It did however give a problem on the workscreen and I did want to use *INKEY$*. So, in Line 1, we print a red block, *CHR$(191)* and then look for a keystroke. If there is none, the *FORX=0TO5:NEXT* gives a little delay before the backspace character, *CHR$(8),* is printed. The program loops back to one to print the red block again and look for a character. If a key is stroked, the backspace is printed and we return to the calling routine with the character in I$.

This is a destructive cursor, so you need to see that it operates on a white space on the screen. The *PRINT@328,“”;* in Line 2100 defines the cursor position on the screen and the location that any future printing will start.

The next step was to develop the new file module and its associated subroutines. Some fundamental decisions were needed. In my old checkbook program new entries were written towards the bottom of the screen and the previous entries were scrolled up the screen. A heading was rewritten each time at the top of the screen. To speed things up, I decided to keep only two entries on the screen at a time, the current one and the previous or last one. The screen heading and function prompts at the bottom will not be erased since information will be written to specific screen locations and the screen will not be scrolled. This does not say that the records themselves will not be scrolled since we can do this without scrolling the entire screen.

One primary printing tool will be *PRINT@XXX,* which allows us to specify at which of the 511 possible printing position we want printing to start. The other will be *PRINT USING X$;* which formats the way data will be printed according to a specification string. For example, we want to print money amounts in the form ##,###.##. In the initialization section a string “##,###.##” is assigned to variable SS$. The statement *PRINT USING SS$;3456* causes the number to print in the format 3,456.00. From the subroutine in Line 37 we have the code *PRINT@247,USINGSS$,CB;*. This causes the number CB, balance in the current record, to be printed in the nine-character space starting at location 247. The number will be formatted and justified on the decimal point. Since the last character is on the last position on the line, BASIC will always send a carriage return, so the semicolon is added to suppress a second return and keep the print position at the beginning of the next line on the screen.

Before we can print anything, we need to decide whether that which is to be printed is in string or numeric form and how many characters will be involved. Anything can be put into characters in a string. In my old program, I put all data relative to each transaction into a single string. Now, being older and wiser, I decided to do things a little differently.

Let's start with the check number field. Most of the time it is a number, but sometimes it must hold DEP for deposit or ADJ for adjustment. A string is needed. The date in the form 7/3 needs a string variable. Since I do not expect to enter the year, five characters will suffice. For example, 12/20. Now the amount of the transaction and the resulting balance might go either way. If these were put into strings, then they would need to be converted back to numeric variables for math operations. In a numeric array it takes five bytes to store a number. Storing a number like 12.42 takes five bytes in a string plus another byte for the field separator we will discuss in a bit. So suddenly the decision is simple, put the amount and the balance in a numeric variable.

The other two pieces of data go into string variables. They are an O or C for outstanding or cleared and the contents of the note field.

Earlier I dimensioned a string array and a two dimension numeric array for data storage. Now we can look at what goes into these arrays. Since we need to keep track of our position in the array, I set up the variable CR to keep the number of the current record being entered or showing in the lower position on the work screen during record reviews. Then, *A(CR,0)* keeps the amount of the transaction for CR and *A(CR,1)* holds the balance. All the other data is combined into one string and put into *A$(CR).*

Let's assume some data. The transaction is a deposit made on June 25 for $250 causing a new balance of $1034.27. Since we have not gotten our bank statement showing this as cleared, it is outstanding and the note says HORSE RACES. The data string will contain the characters in each field separated by $'s. It will look like this — *A$(CR)=“DEP $6/25$O$HORSE RACES”.* That's 22 characters and we estimate an average of 25 for each string when we dimensioned the arrays and CLEARed string space. Line 38 is the one that assembles the string from working variables and loads the numeric array.

```
38 A$(CR)=CC$+“$”+CD$+“$”+LEFT$(CS$,1)+“$”+
CN$:
A(CR,0)=CA:A(CR,1)=CB:RETURN
```

There are two sets of working variables, those for the current record and those for the previous or last record.

Purpose	**Current**	**Last**
Check #	CC$	LC$

Date	CD$	LD$
Amount	CA	LA
Balance	CB	LB
Status	CS$	LS$ Cleared or Outstanding
Note	CN$	LN$

Current Record Number	CR
Last Record in File	LR
Last Bank Balance	BB

At this point I admit to confusion in how the term last is used. The working variables LC$, LD$, etc. refer to the record just before the current one. However, LR is the last record in the total file. I understand it so I won't change it now, but this points up how easy little things that may confuse others can slip through.

Design of the working screen was at least a five-sheet effort to finalize what would be on it and where. Even then I made some small changes after I had the first cut running.

```
2120 CLS:GOSUB50:PRINT:PRINT:
PRINT"ENTER LAST BANK STATEMENT
BALANCE ";:
LINEINPUTI$:BB=VAL(I$):PRINT@128,STRING$
(64,32):
GOSUB52:GOSUB54:GOSUB58
```

Line 2120 clears the screen and then goes to subroutine 50 to print the heading. Next it asks for the last bank statement balance. Remember that we are starting a new file at this point. Here and later I use *LINEINPUT* to avoid the question mark that *INPUT* prints. However, *LINEINPUT* only accepts strings and we need to use *BB*=VAL(I$) to convert to a numeric variable. Throughout the program, I use I$ as a temporary input variable whose value, if it is to be kept, will be permanently stored in some other variable. Once the balance is entered, *PRINT@128,STRING$(64,32)* erases the question. Finally, the prompt texts at the bottom of the screen are printed using subroutines 52, 54 and 58.

```
50 PRINT@8,RC$,"ITEM  DATE    AMOUNT
BALANCE":RETURN
52 PRINT@352,"LAST BANK BALANCE ";:
PRINTUSINGSS$;BB:RETURN
54 PRINT@384,"<ENTER>=NEXT CHECK #","1ST
DIGIT STARTS NEW # SERIES":RETURN
56 PRINT@448,"dEPOSIT  aDJUSTMENT vOID
cLEARED eDIT   sAVE lOAD nEW MONTH  "CHR$
(94)""S";:RETURN
58      PRINT@448,"dEPOSIT   aDJUSTMENT
vOID","eDIT      sAVE "CHR$(94)""S";:RETURN
```

The title *Rainbow Checkbook* was put into RC$ in Line 2050. Now, in Line 50, it is printed centered on the top line. The comma causes the cursor position to advance to the beginning of the second line where the column headings are printed. The last bank balance, formatted using ##,###.##, is printed on Line 12 of the screen by subroutine 52. The text printed by Line 54 prompts the two ways to enter a check number. If only an ENTER is keyed the last check number is incremented by one to be the new check number. Otherwise, if any numeric digit is keyed, it becomes the first digit in a new check sequence. Line 56 prints all the other functions that will be available from input mode. However, not all are appropriate when creating a new file. All items will be outstanding, the user will already have decided not to load a file nor is the new month function to pull out cleared items to an archive file appropriate. Line 58 is a shortened version used in the new file routine.

```
2130 PRINT@320,"ENTER OUTSTANDING ITEMS
";:PO=224
```

Line 11 starting at *PRINT@*, position 320 is reserved for messages to the user. In Line 2130 the message ENTER OUTSTANDING ITEMS is printed and then the position variable PO is set to 224, the position where date enter begins.

This is a good break point for this month. We have covered a lot of the early work that goes into a program, but have not shown much BASIC code. The more time you spend early in program designing, the less total time you will spend writing the program. But we do have one last item to cover. Remember the old admonition to save early and often? Below are a couple of lines to make saving easy.

```
10000 SAVE "RNBWCKBK"
10000 INPUT"WANT TO RUN PAST LEADER";I$:
IFI$="Y"THEN MOTORON:FORX=1TO6000:NEXT
10010 FORC=1TO2:CSAVE"RNBWCKBK":MOTOR
ON:FORX=1TO600:NEXT:NEXT:MOTOROFF
```

RUN or *GOTO 10000* will automatically make your save using the right name. The cassette routine also asks if you want to run past the leader and if so runs the recorder for about 15 seconds before making two saves with space between each save. Making things easier is what computing is all about.

Next month we will pick up with the data entry routines and scrolling backwards and forwards through the file. We should also be able to cover the Input, Edit, New Month and I/O modules.

Ed to Earth . . .

The Video Connection

If you want to record your CoCo's pictures and sound using a VCR, the easiest way to connect the two is to feed the CoCo's RF output to the VHF input on the VCR tuner. Instead of using the TV/computer switch, get an adapter (such as Radio Shack's 278-255) to mate the CoCo's cable to the antenna input. Leave the TV or monitor connected to the VCR in the usual way. Just tune the VCR to channel 3 or 4 (whichever you usually use).

An alternative is to modify the CoCo for direct video and audio output; a number of kits are available to do this. With the mod installed, just connect the CoCo to the video and audio input jacks on the VCR and switch from the TUNER input position to the LINE input (marked CAMERA on a number of units). With a few portable VCRs you will need to buy an adapter to connect the video and audio lines to the VCR's camera jack; on certain others you plug the lines into the tuner/timer instead of the recorder.

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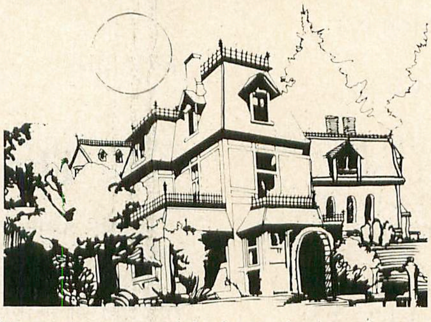

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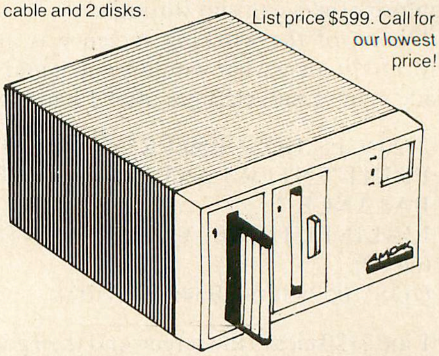

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A 4K Color BASIC program that really does something

WORD SCRAMBLER FOR SPELLING LISTS

By John F. Wilfore

As a somewhat novice programmer, I've found that *Word Scrambler for Spelling Lists* has not only been a fun exercise in some Color BASIC programming, but also a very interesting application of the *RND* (random number function). The result is a very useful and entertaining educational program that provides drill and practice of assigned spelling words in a challenging "scrambled word" format. In addition to providing me with a chance to practice and improve my own programming skills and use the TRS-80C, *Word Scrambler* has given my third-grade son a chance to use the computer for more than just games. He is actually building language arts, logic and computer skills all at the same time.

The programming task was to use the *RND* function to select words from a weekly assignment list of 15 words contained in *DATA* statements, making sure that each word in that list is chosen only once. When the word is selected from the appropriate list, the letters are then scrambled and displayed on the screen in random order. The child is then asked to unscramble the letters and type in the correct spelling of that word.

Sound provides either positive or negative reinforcement, and if the answer is incorrect, the correct spelling is given. A running score is displayed, which includes the child's name. To insure self-pacing, the student is asked to "press any key" to continue. At the conclusion of the lesson, a grade score is also given.

Interacting with the keyboard, selection of various weekly assignments and a personal touch by using an individual's name, provide for an entertaining and meaningful experience for younger students just being introduced to computers.

Now that we know all of the wonderful things that the program can do for the student, let's take a look at how the program works — basically with the *RND* function. The first task at Line 320 was *FOR K=1 to 15* to select 15 different words from a given list. Setting variable *X=RND(15)* gave a random number, and if X was unique (hadn't been used before), it was sequentially inserted into array R1. If not, a new X would be generated until it was unique. Each time a new X was generated, R1 was tested to determine if X had been generated previously.

Once a unique word was selected — *A$(X)* — the next task was to scramble its letters. First, the length of the word was determined at Line 440 using *L=LEN (A$(X))*. Next, variable *Y= RND(L)* generated another random number, and if Y was unique, it was inserted into R2 array. Each time a new Y was generated, R2 array was tested to

---

(John Wilfore, a manager for General Electric, uses his CoCo's word processing and spreadsheet capabilities for both home and "homework" applications. His nine-year-old son, Jason, also enjoys the CoCo for games, graphics and educational programs, mostly from RAINBOW.)

determine if that Y had been generated previously.

In Line 570, using *FOR I=1 TO L*, for L number of letters and using *MID$* of *A$(X)*, one letter at a time, the scrambled set of letters from *A$(X)* could easily be generated and displayed to the student. A comparison between the original word, *A$(X)*, and the answer input by the student, *D$*, is then done, confirmation given, and the next random word is selected, till done. While the looping portion of the program is a little complex, the remainder of the coding is rather straightforward.

In summary, the program itself was an excellent programming exercise in the use of loops, arrays, input and output and text screen formatting. A subroutine at Line 1020 is even accessed using the variable AT to indicate the desired *PRINT* @ location of a set of graphics characters, used to enhance the text screen. Written exclusively in Color BASIC, the program should run in 4K by simply removing the *REM* statements.

The unique combination of being very useful and an interesting programming exercise might stimulate others to modify the program. I'm sure that extra graphics and perhaps even a "hint" function would further enhance the program. The following list of variables will be useful:

STRING VARIABLES

A$(15)— array for selected word list
C$ — single random letter, from *MID$*
D$ — student word, compared to *A$(X)*
N$ — student name

NUMERIC VARIABLES

R1(15)— array for word pointers, init. to 0
R2(10)— array for letter pointers, init. to 0
AT — variable for *PRINT* @ subroutine
C — counter for correct responses
I — index for loop
J — index for loop
K — index for loop to select 15 random words
L — length of random word
N — random numbers for letters in R2
W — week of spelling list assignments
X — random number for word index
Y — random number for letter index

390...... 143
720....... 95
1040 164
END 59

The listing:

```
10 '****************************
20 '*      WORD SCRAMBLER      *
30 '*           FOR            *
40 '*      SPELLING LISTS      *
50 '*                          *
60 '*    COPYRIGHT 1983 BY     *
70 '*      JOHN F. WILFORE     *
80 '*   ALL RIGHTS RESERVED    *
90 '****************************
100 DIM A$(15), R1(15), R2(10)
110 RESTORE
120 C=0
130 CLS(3)
140 AT=96:GOSUB 1020
150 PRINT @ 128,"WELCOME TO YOUR
 SPELLING LESSON"
160 AT=160:GOSUB 1020
170 PRINT @ 260, "WHAT'S YOUR NA
ME";
180 INPUT N$
190 PRINT @ 356,"WEEK 1 THRU 5";
200 INPUT W
210 '*** READ IN PROPER WORD LIS
T ***
220 FOR I=1 TO W
230 FOR J=1 TO 15
240 READ A$(J)
250 NEXT J
260 NEXT I
270 '*** INITIALIZE WORD ARRAY T
O ZEROS ***
280 FOR I=1 TO 15
290 R1(I)=0
300 NEXT
310 '*** GENERATE RANDOM WORDS *
**
320 FOR K=1 TO 15
330 X=RND(15)
340 '*** CHECK TO SEE IF WORD US
ED PREVIOUSLY ***
350 FOR I=1 TO 15
360 IF R1(I)=X THEN GO TO 330
370 NEXT
380 R1(K)=X
390 '*** INITIAL LETTER ARRAY TO
 ZEROS ***
400 FOR I=1 TO 10
410 R2(I)=0
420 NEXT
430 '*** RANDOMIZE LETTERS ***
440 L=LEN(A$(X))
450 FOR I=1 TO L
460 Y=RND(L)
470 '*** CHECK IF LETTER USED PR
EVIOUSLY ***
480 FOR J=1 TO 10
490 IF R2(J)=Y THEN GO TO 460
500 NEXT J
510 R2(I)=Y
520 NEXT
530 '*** SCRAMBLE & TEST ***
540 CLS(3)
550 PRINT @ 68, "UNSCRAMBLE THES
E LETTERS";
560 PRINT @ 128," ";
570 FOR I=1 TO L
```

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```
580 N=R2(I)
590 B$=A$(X)
600 C$=MID$(B$,N,1)
610 PRINT C$;
620 NEXT
630 INPUT D$
640 '*** CONFIRMATION SECTION **
*
650 IF D$=A$(X) THEN C=C+1 ELSE
GO TO 750
660 SOUND 130,3:SOUND 199,5
670 AT=224:GOSUB 1020
680 PRINT@256, "CORRECT! YOU NOW
 HAVE ";
690 PRINT C;
700 PRINT "RIGHT"
710 PRINT @ 288, "       NICE GOI
NG ";
720 PRINT N$
730 AT=320:GOSUB 1020
740 GO TO 810
750 SOUND 20,3:SOUND 5,3
760 AT=224:GOSUB 1020
770 PRINT @ 256, " ";
780 PRINT A$(X)
790 PRINT @ 288,  " WAS THE CORR
ECT WORD"
800 AT=320:GOSUB 1020
810 PRINT@419, "PRESS ANY KEY TO
 CONTINUE";
820 K$=INKEY$:IF K$=""THEN GO TO
 820
830 NEXT K
840 '*** TEST IS DONE. LAST SCRE
EN ***
850 CLS(3)
860 AT=0:GOSUB 1020
870 PRINT @ 64, "CONGRATULATIONS
 ";
880 PRINT N$
890 SC=INT(C/15*100 + .5)
900 PRINT @ 128, "YOUR GRADE WAS
 ";
910 PRINT SC;
920 PRINT " %"
930 PRINT @192, "FOR WEEK NO. ";
940 PRINT W
950 AT=256:GOSUB 1020
960 PRINT @ 320, "DO YOU WANT AN
OTHER TEST Y OR N";
970 INPUT T$
980 IF T$="Y" THEN GO TO 110
990 PRINT @ 416, "COME BACK AND
SEE ME AGAIN SOON,";
1000 END
1010 '*** PRINT @ SUBROUTINE ***
1020 FOR I= AT TO AT+31:PRINT @
I, CHR$(182);
1030 NEXT
1040 RETURN
1050 '*** WEEK 1 - CONSONANTS
1060 DATA FLAG,FED,HID,DOT,HUNT,
APPLE,BRING
1070 DATA CLUB,ELSE,HAPPY,PEN,RI
VER,ROCK,SHALL,SUNNY
1080 '*** WEEK 2 - DOUBLE LETTER
S
1090 DATA ADD,CLIFF,DRILL,ILL,KI
SS,LESS,MESS
1100 DATA ODD,ROLL,SHELL,SMELL,S
PELL,SPILL,STUFF,UNLESS
1110 '*** WEEK 3 - USING VERBS
1120 DATA BAT,CHOP,CLAP,DROP,NAP
,PIN,STEP,SKINNED,STOPPED
1130 DATA TRAPPED,TRIPPED,TAGGIN
G,PLANNING,WAGGING,TAPPING
1140 '*** WEEK 4 - CONSONANT CLU
STERS
1150 DATA SNOW,STAR,STATE,STICK,
TRICK,STRING,SPRAY,SPRING
1160 DATA CLEAR,CLOSE,DRAWER,DRI
VE, FLAT,FLOOR,PRINT
1170 '*** WEEK 5 - MORE CONSONAN
T CLUSTERS
1180 DATA ACT,DUST,EAST,TEST,WES
T,LIFT,BEND,GRAND
1190 DATA GROUND,WIND,BUILD,CHIL
D,WILD,MILK,BUMP
```

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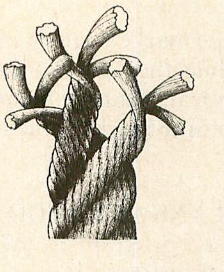

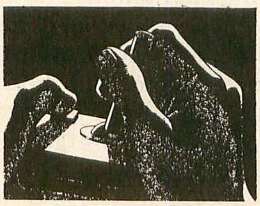

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PIPELINE

A NEW PRESIDENT has been named at Radio Shack. Mr. Bernard Appel has been named to replace Jon Roach, who has relenquished that title but remains as chairman of the board. Appel has been the senior vice president to whom the people who run the computer merchandising operation have reported, so he is well-grounded in the computer sales operation at Radio Shack. The move could be seen as a further commitment of Radio Shack to its computer sales and marketing.

Speaking of sales and marketing, there is a new company under the Tandy umbrella — Tandy Home Education Systems. The purpose of the new firm is to market Color Computers through home sales — using qualified leads just like high-class encyclopedias. No, it is not a door-to-door operation — Tandy has made that very clear. But, Tandy Home Education Systems is, in reality, the first step in bringing computers directly to people's homes. It seems to be a brilliant marketing move.

* * *

A NEW BUNCH of programs will be coming up in the CoCo market in the next six months. One of the least talked about is something that is new on the computer front — an information processor. Essentially, this is an outline-creation program that lets someone organize things into logical thoughts and order. Such programs, of which there are only a very few, are on the drawing boards of at least one software firm. Sometimes they are called "thought processors."

* * *

ALSO COMING UP are new programs that do new things, particularly in the game area. One of the nice trends that we hear about is *original* game programs — new ideas and concepts. And, also on this general subject, expect to see more "thinking games" in the future.

* * *

ONE MORE AREA we keep hearing about is specific programs for specific tasks. Probably the best example of this type of thing is an Amway program that allows someone to run an Amway business with a CoCo. But these vertical-type markets are an important one and, while they do not have wide popular appeal, industry people say they have a definite market potential.

* * *

PLANS ARE AFOOT for RAINBOWfest's program to take a new form — with information on the type of merchandise to be found in specific booths and special information on new product introductions. With more than 50 booths at the shows, we're looking for a better way to help you get around and see everything.

* * *

A LIVELY DEBATE was part of the last RAINBOWfest on advanced operating systems. With all the attention given to FLEX and OS-9, Peter Stark, developer of STAR-DOS voiced the opinion that he felt he might be getting overlooked. We understand that Stark and STAR-DOS have a new marketing approach and that you'll be hearing more about this system in the future.

* * *

SILICON VALLEY? Valley Micro Systems has just announced the acquisition of Silicon Rainbow Products. As of May 5, 1984, Valley Micro has obtained exclusive distribution rights to the entire Silicon Rainbow Products' line of software, including Jeff Francis' *Color-80 BBS* and the latest version of *DisUtility*, version 2.1.

All future orders for products previously distributed by Silicon Rainbow Products should now be directed to Valley Micro Systems, 801 W. Roseburg Ave., Suite #200, Modesto, CA 95350; voice (209) 529-4343, BBS (209) 526-2030.

* * *

RADIO SHACK has penned an agreement with the Softlaw Corporation to market the complete VIP Library through its Express Order Software program. The VIP Library is comprised of the four most popular business software programs: *VIP Writer, VIP Calc, VIP Database* and *VIP Terminal*, along with *VIP Speller* and *VIP Disk-ZAP*.

With the Express Order Software program, customers may go to their local Radio Shack stores, have any of the programs demonstrated, order the program desired and expect delivery in between one and four days. Warranty, maintenance and support will still be provided by Softlaw.

VIP Calc and *Writer* sell for $69.95; *VIP Database* sells for $59.95; and *VIP Terminal, Speller* and *Disk-ZAP* all sell for $49.95. For more information, contact Softlaw Corporation, 9072 Lyndale Avenue South, Minneapolis, MN 55420, or visit your local Radio Shack store.

* * *

SPEAK UP ONCE AGAIN! Classical Computing has introduced a revision of their *Speak Up!* voice synthesizer program for the Color Computer. *Speak Up! 2.0* is identical to the original program except that the voice is a little clearer and a bug which caused a printer to print garbage has been fixed. Any program using the old *Speak Up!* will work with the new version without modification. The price is still $29.95, postage paid.

The company has announced that anyone who sends in their copy of *Speak Up!* will receive the new version free. Write to Classical Computing, Inc., Box 3318, Chapel Hill, NC 27515.

* * *

AN EDUCATIONAL BBS has been placed on-line by the Color Computer Club of Youngstown Ohio for its educational activities. The educational bulletin board system, along with the club's main BBS, is free and open to all callers, with public domain programs available for downloading. Both educators and students have been invited to call and lend a hand.

The new Computer Aided Instruction System educational BBS can be accessed at any time except between 4:00 and 5:00 a.m. at (412) 662-2247; David and Amy Martin, SySops.

* * *

THE PRESSES KEEP ROLLIN'. Falsoft, Inc., parent company of FPSS, Ag. Publishing Enterprises, Inc., has introduced another in its growing line of system-specific computer magazines. With the premiere of SOFT SECTOR in July, the owners of Sanyo 550/555 series computers now have an invaluable source of up-to-date information and programs for their machines.

Now, owners of the Sanyo 550/555 can expect the kind of support that THE RAINBOW has been offering for the Color Computer for more than three years.

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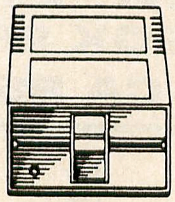

DRIVE 0 System - 40 trks, Gold Platted Connectors - $299.95
AMDEK System - 624K Bytes with 3" Disk Cartridge - $499.00
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(Systems include controller)
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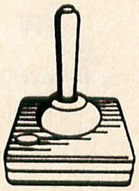
GAME CONTROLLERS



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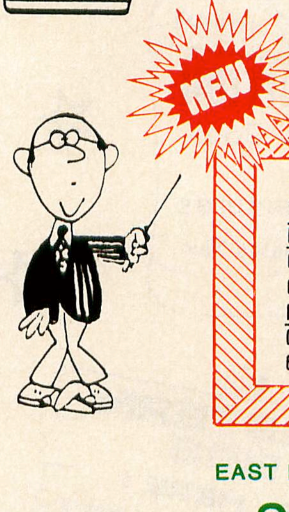
5. OS-9	$69.95
6. FHL Flex	$69.95
7. DEFT Pascal	$79.95
8. MicroWorks MACRO-80C	$99.95



NEW PRODUCTS

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YELLOW Mail Labels (1K)	$14.95
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(see Feb '84 Rainbow Review)

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(see June '83 Rainbow Review)

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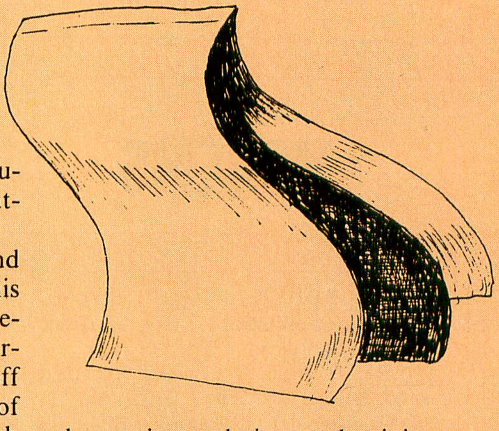
Teachers Need Spirit Masters

By Valerie Rhead

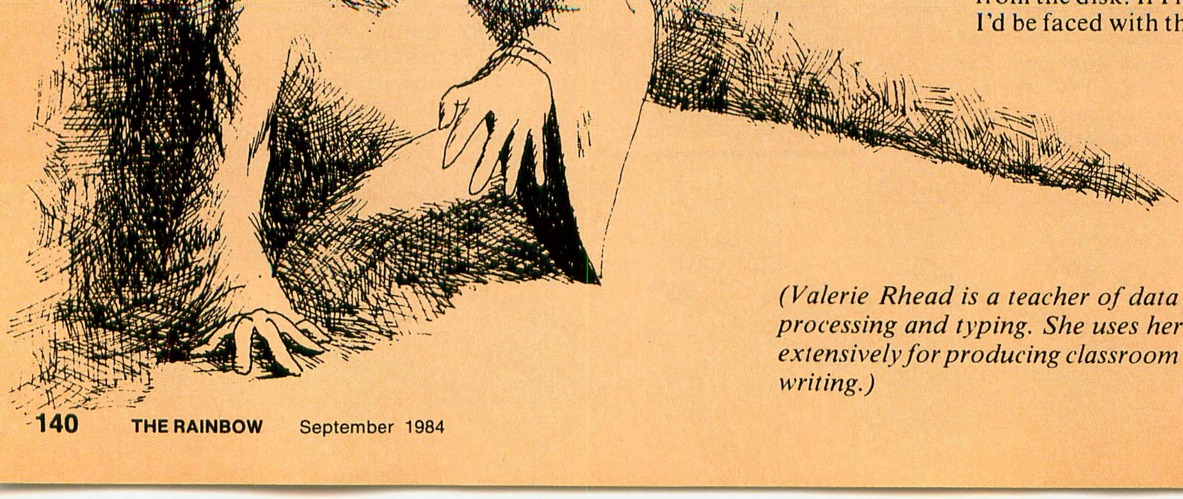


There was a time when teachers could be distinguished by the patina of chalk dust that clung to their clothing. Nowadays, they are most easily identified by their purple fingertips. Educators of students in all subject areas and at all grade levels have an insatiable need for printed classroom materials, such as tests and worksheets. Usually the most convenient and economical means of providing these is with spirit masters (which often come in a highly visible shade of purple). I routinely use my Color Computer for creating these stencils.

The computer's editing features and memory make it a superb tool for this purpose. Gone forever are the double-edged razor blades that threatened mortal injury as you laboriously scraped off errors sculpted in carbon. Also a relic of the past is the necessity of typing each test or assignment from scratch.

I store all the things that I use repeatedly on disk. For example, a standard exam cover page can be loaded into the computer. I don't have to recalculate all the spacing each time so that it is attractively centered. Standard test questions also can be saved and retrieved as needed. Not only does this save time, but it is more accurate. It's very easy to omit an essential instruction when you're rushing to make up a test. You can save yourself the aggravation of little hands popping up asking you something that should have been clearly stated.

If the original "ditto" becomes exhausted, it's easy to print another one from the disk. If I had used a typewriter, I'd be faced with the futile task of trying



(Valerie Rhead is a teacher of data processing, word processing and typing. She uses her Color Computer extensively for producing classroom materials, and for writing.)

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see NOV'83 Rainbow Review

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to make an acceptable photostat of the *112th*, very faded copy of a spirit master. If that didn't work, I'd be stuck with the boring job of retyping the whole thing. How did I ever manage to get along before I had a computer?

Know Your Printer

The key to producing a good spirit master is the printer. When we first got our Radio Shack LP VIII, I was disappointed that it didn't print a good ditto. I quickly found though, that it did a very acceptable job when the ribbon was removed. As the ribbon is in a cartridge, it's quite simple to remove and reinsert it.

When you type without a ribbon, proofreading your work is more difficult. It can be accomplished (with only a slight bit of eyestrain) by reading the imprint on the carbon. I did notice, however, that I allowed more errors to slip by doing it this way. This is particularly embarrassing for a typing teacher.

Another problem I encountered with the LP VIII was that the paper-out switch would activate and stop printing about two-thirds of the way down the sheet. This was unacceptable. I solved the problem by feeding in a small piece of paper at the left-hand end of the platen, and taping it in place so it wouldn't advance. This temporarily depressed the switch and I was then able to print to the end of the page. It is important that, when the switch is deactivated, you make sure that you don't print off the end of the sheet. Particularly when printing without a ribbon, this could damage the platen, and they're expensive to replace.

Awhile ago, we acquired a Gemini 10X printer. The LP VIII has graduated and gone to college with our daughter. I am happy to report that the Gemini 10X allows you to physically turn off the paper-out switch. This can also be done, according to the manual, under software control.

I was delighted to discover that the new printer will produce a very good spirit master with the ribbon in place, which is achieved by using the emphasized print mode. This has cut down on my proofreading errors substantially, and I can once again look my students in the eye.

Making "Dittos" More Interesting

I often decorate my spirit masters with computer generated pictures and designs. As a kid, I was committed to outlining my artistic creations in black and then filling in the interior with color. Unfortunately, my teacher belonged to a different school, so my masterpieces were routinely returned with a grade of 'D.'

When we got our first computer, I was thrilled to discover that even I was now capable of true artistry. Sometimes I draw pictures of realistic scenes, such as a rocket ship taking off through a star-laden sky. I also like to create the kind of abstract patterns that use lots of *FOR . . .NEXT* loops. I usually invent my own designs, but sometimes I'll use a graphics program from a magazine.

I use a screen print program and print my creations at the top of a spirit master. Sometimes I attain interesting effects by running the same spirit master through the printer more than once with different colored carbons. The remaining space on the stencil is then used for test questions, or worksheet problems for my students to complete.

I sometimes use *Telewriter 64* to create artistic borders for the stencils. I define some of the graphics codes, and then combine them into attractive designs. The possibilities are endless.

Recently, I've started to use Michael Himowitz's *Big Print* program that was in the December 1983 RAINBOW. I can print a message or title in large letters of up to nine characters per line. Right after I got this program, my first message at the top of a short exercise I had prepared for my class was appropriately "Merry Xmas."

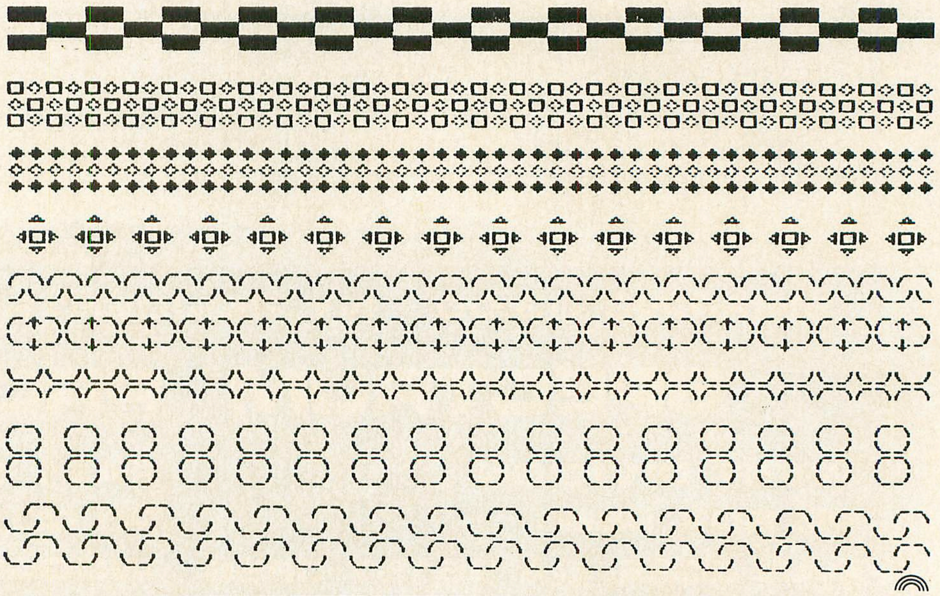
Although producing these designs is time consuming, I usually decorate a large number of sheets at a time, whenever I feel in a creative mood. I then have a stockpile of attractive spirit masters on hand for later use, when I'm rushing to produce a test for tomorrow's class.

The graphics make life a little more interesting for my students, because they don't get the same boring looking sheets to work from every day. It also provides my data processing class with a practical demonstration of one of a computer's capabilities.

They're sometimes useful, too, as a classroom management device. "Class, you should have three sheets: one that says 'Computers are Fun' at the top; one that has a picture of a rocket ship; and another with a border made up of circles."

It simplifies life if the students are returning the sheets. You don't have 105 copies of three different sheets all mixed up together. Kids will try to put paper in the correct pile, if it's sufficiently obvious that they can do it without breaking stride as they head out the door for lunch.

I hope some of these suggestions will assist you in using your Color Computer to make spirit masters for your classes. I have access to dedicated word processors and more expensive brands of microcomputers at school. Now that I have mastered the idiosyncrasies of my TRS-80 system, I find that the Color Computer does everything I want. In some cases, it out-performs the school's more costly equipment. Having a computer at home offers one big advantage. When I arrive back at school with the tennis team at 5:30, I don't have to stay at school over the dinner hour to work on the word processor in order to prepare tomorrow's assignments.



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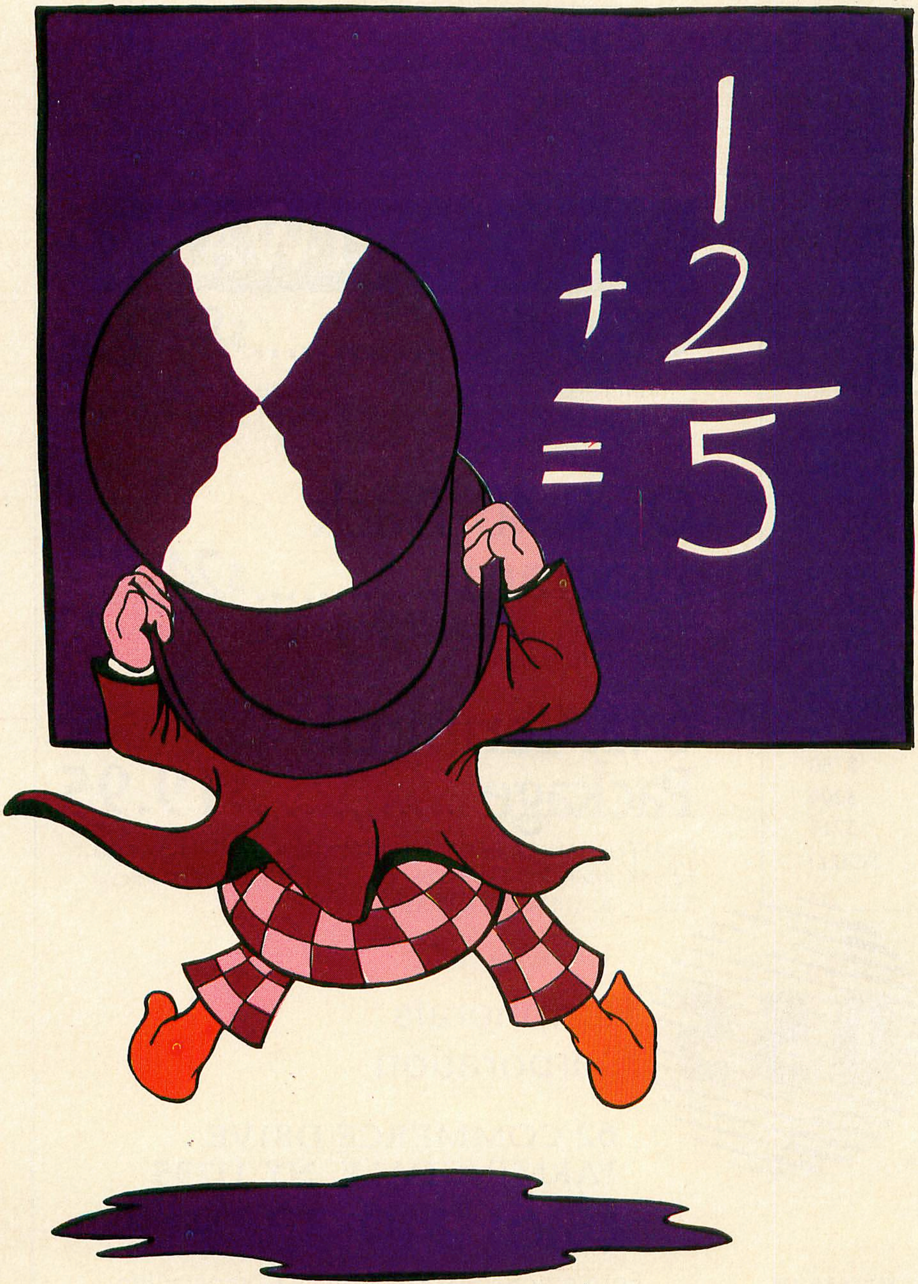
Why do we call this exercise in math and logical thinking the Mad Adder? Well, how much are two ducks to the base 10?

The *Mad Adder*

By Larry K. Gage



The *Mad Adder* is a mathematical logic-type game. The object of the game is to figure out the proper number replacements for each symbol so that the problem is a mathematically correct addition problem. An addition problem will be shown with the numerals replaced by graphics symbols. Each symbol shown represents one (and only one) number and likewise a number is represented by only one symbol.

To play *Mad Adder*, insert the cassette and type *CLOAD"MADADDER"* and ENTER. The program uses the highest resolution graphics (*PMODE4*) and four colors, and requires 32K memory to run. Type *RUN* and program execution will begin. A simple explanation of the game's object will be given and then followed after an interval by an example problem. The time interval is used by CoCo for drawing, coloring, and getting the symbols into arrays.

After the example problem is completed you continue program execution by pressing any key. CoCo will then respond by asking you to enter the difficulty level (one, two or three) that you wish to try. Level one is the easiest (numbers between one and 199) and level three, the most difficult (numbers between one and 19,999).

The graphics addition problem will be drawn and you will be asked your guess for the numeric value of the upper-right symbol. Respond by pressing a number key from zero through

---

(Larry Gage is a civil engineer employed by the State of California-Department of Water Resources. He is interested in educational applications and graphics with the Color Computer.)

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nine. Your entry will be inserted into the appropriate spots in the numeric solution area of the screen and you will be asked for your guess for the next symbol. The program does not allow you to enter the same number for two different symbols.

After you have made a guess for each symbol, CoCo will inform you if your guesses result in a mathematically correct addition problem or not. If it is correct, the screen will show "good solution" and then tell you the length of time you required to solve the problem, as well as the number of clues given. It then re-initializes as necessary and asks you to enter the difficulty level for another problem. If your guesses did not result in a mathematically correct addition problem, your incorrect solution will be erased and the number of tries you have attempted will be shown. If you want a clue, press 'C' when asked for a guess. If CoCo responds "you already guessed that" when you press 'C', then you have already made an erroneous guess. (At that point you may want to start over on the same problem — which can be done by pressing 'S'.)

Important Notes

1) You are only allowed nine tries to solve any problem.
2) If a problem appears too difficult, simply press 'Q' when you are asked to guess the value of a symbol, enter the difficulty level you desire, and a new problem will be generated.
3) If you discover you have "messed up" and want to start over on the same problem simply press 'S'.

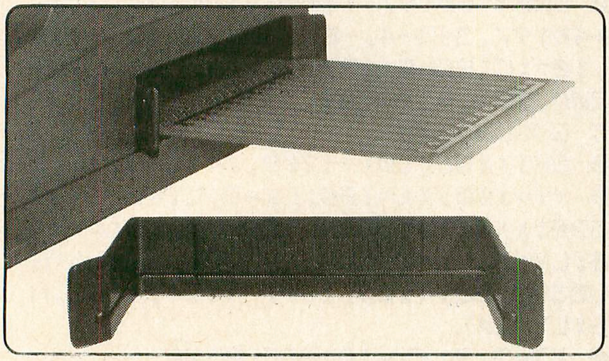
46	80	1000	146
225	70	1150	179
350	192	1300	65
600	190	1550	17
790	225	END	193

The listing:

```
5 'MADADDER V1.9 11/08/83
10 CLS0:PRINT@42,"the";:PRINT@46
,"mad";:PRINT@50,"adder";:PRINT@
64,"1";:PRINT@66,"k";:PRINT@68,"
gage";:PRINT@83,"copyright";:POK
E1116,49:POKE1117,57:POKE1118,56
:POKE1119,51:X=RND(TIMER):'V 1.1
15 FORI=1024 TO 1055:POKEI,182:N
EXTI
16 FORI=1504TO1535:POKEI,246:NEX
T
20 PRINT@160," THE OBJECT OF THI
S GAME IS TO  SOLVE A MATHEMATIC
AL PROBLEM IN WHICH THE NUMBERS
0 THRU 9 HAVE BEEN REPLACED BY U
NIQUE SYMBOLS.";
25 POKE178,0:GOSUB1570
30 PCLEAR4:PMODE4,1:COLOR0,1:PCL
S
40 DIM N1(15),N3(15),N4(15),N8(1
5),N9(15),N0(15),AN(3),AR(13),AA
(13),Z$(10),J(10),M1(15),M2(15),
M3(15),M4(15)
45 PRINT@420,"BE PATIENT--I'M DR
AWING";
46 GOSUB1590
50 FORI=1TO10:J(I)=I:NEXTI
55 GOSUB1580:PCLS
60 SA=0:GOSUB1330:LX=24:LY=24
70 XX=10:YY=10:LINE(9,9)-(35,35)
,PSET,B:DRAW"BM22,33E10UEU6HUH2L
5G3H3L5G2DGD6FDF10":POKE178,13:P
AINT(11,11),,0
80 GET(10,10)-(34,34),N1,G
85 POKE178,0
120 X=72:Z=0:CL=0:NT=1:GOSUB1570
125 GOSUB1580
130 POKE178,1:FORY=28TO34:FORQ=X
-Z TO X+Z STEP2:LINE(Q,Y)-(Q,Y),
PSET:NEXTQ:Z=Z+2:NEXTY:LINE(72,1
8)-(72,28),PSET:FORY=10TO18:FORX
=62TO82STEP2:LINE(X,Y)-(X,Y),PSE
T:NEXTX,Y:POKE178,157
140 GET(60,10)-(84,34),N4,G
145 POKE178,0
191 CIRCLE(22,52),12,,.7:CIRCLE(
22,52),10,,.8:CIRCLE(22,52),8,,.
7:POKE178,130:PAINT(22,52),,0:PO
KE178,0:PAINT(31,52),,0
192 GET(10,40)-(34,64),N3,G
195 GOSUB1580
210 PRINT@416,"A SAMPLE PROBLEM
IS COMING UP.. PRESS ANY KEY AFT
ER SAMPLE PROB ";
220 DRAW"BM197,10M+4,+8M209,22M-
8,+4M197,34M-4,-8M185,22M+8,-4M1
97,10":CIRCLE(197,22),6,,.9:PAIN
T(200,20),4 'STAR
225 GOSUB1570
230 GET(185,10)-(209,34),N8,G
240 YY=100:XX=100:LX=8:LY=24:GOS
UB320:XX=116:GOSUB320:XX=101:YY=
100:LY=8:LX=24:GOSUB320:YY=116:G
OSUB320:GET(100,100)-(124,124),N
9,G:LY=24
250 XX=219:YY=10:GOSUB320
255 POKE178,31:PRINT@326,"G O O
D   L U C K";
260 LINE(219,22)-(237,34),PSET,B
F:LINE(224,10)-(241,22),PSET,BF
265 POKE178,0:LINE(216,36)-(244,
9),PSET
270 GET(218,10)-(242,34),N0,G:PO
KE178,0
280 GOSUB1460
285 GOSUB1580
290 IFSA=0THENDL=1:NT=9:GOTO310
300 GOSUB1460:GOSUB1480
310 PCLS:CLS0:GOTO340
315 GOSUB1580
320 FORM=YY TOYY+LY:FORN=XX TO X
```

```
X+LX STEP2:LINE(N,M)-(N,M),PSET:
NEXTN,M:RETURN
330 '---SET UP VALID PROBLEM--
340 X=RND(9899):AN(1)=RND(X)+100
:AN(2)=RND(9899)+100
350 Z=-1*(DL=3)-10*(DL=2)-100*(D
L=1)
360 FORI=1TO2:AN(I)=INT(AN(I)/Z)
:IFAN(I)<1THENAN(I)=1
370 NEXTI
380 AN(3)=AN(1)+AN(2)
385 GOSUB1580
390 '  --- SHUFFLE SYMBOLS---
400 FORI=1TO20:X=RND(10):Y=RND(1
0):IFX=Y THEN420
410 Z=J(X):J(X)=J(Y):J(Y)=Z
420 NEXTI
430 '-- SET PROB ARRAY LOCS NEG
440 FORI=1TO13:AR(I)=-1:NEXTI:NM
=0
450 FORI=1TO3:NM=NM+1:Z(I)=INT(A
N(I)/10):AR(NM)=AN(I)-10*Z(I)
460 NEXTI:GOSUB1580
470 FORI=1TO 3:FORJ=1TO3
480 NM=NM+1:IFZ(J)=0THEN490ELSEA
R(NM)=Z(J)-INT(Z(J)/10)*10:Z(J)=
INT(Z(J)/10)
490 NEXTJ
500 NEXTI
510 IFAN(3)>9999THENAR(13)=1
520 LY=132
530 FORI=1TO13:Z=AR(I):LX=118
540 IFI>3THENLX=90:IFI>6THENLX=6
2:IFI>9THENLX=34:IFI=13THENLX=6
:LY=132:GOTO580
550 IFLY=132THENLY=70:GOTO580
560 IFLY=100THENLY=132
570 IFLY=70THENLY=100
580 GOSUB630:NEXTI
590 LINE(0,95)-(12,95),PSET:LINE
(0,94)-(12,94),PSET:LINE(6,89)-(
6,101),PSET:LINE(7,89)-(7,101),P
SET ' + SIGN
600 LINE(12,127)-(144,128),PSET,
B
620 GOTO800
630 Y=Z:IFZ=0THENY=10
640 IFY<0THEN RETURN
650 FORM=1TO10:IFY=J(M)THEN660EL
SENEXTM
660 XL=LX+24:YL=LY+24
670 ON M GOTO 690,700,710,720,73
0,740,750,760,770,680
680 PUT(LX,LY)-(XL,YL),N0,PSET:R
ETURN
690 PUT(LX,LY)-(XL,YL),N1,PSET:R
ETURN
700 PUT(LX,LY)-(XL,YL),M1,PSET:R
ETURN
710 PUT(LX,LY)-(XL,YL),M2,PSET:R
ETURN
720 PUT(LX,LY)-(XL,YL),M3,PSET:R
ETURN
730 PUT(LX,LY)-(XL,YL),M4,PSET:R
ETURN
740 PUT(LX,LY)-(XL,YL),N3,PSET:R
ETURN
750 PUT(LX,LY)-(XL,YL),N4,PSET:R
ETURN
760 PUT(LX,LY)-(XL,YL),N8,PSET:R
ETURN
770 PUT(LX,LY)-(XL,YL),N9,PSET:R
ETURN
780 RETURN
790 GN=AR(I):CL=CL+1:GOTO960
800 DRAW"S4BM10,10D5R3U2D2R3U5BM
+3,+5U10D5R3D5BR3U4ER3D5UGLLBR6U
10D5L2R3BM+6,+5R4L4U5R4U5D10BR3U
5R4D5L4BR10U5D5R4U5D9LBM+5,-4U5R
4D5L4BR7U5D5R4U5"
810 DRAW"BM+6,+5R4L4U5R4D9LBM+4,
-4U5D5R4U5BR3R3FDL4U2D4FRREBR3FR
REUHLLHUERRFBM+3,+4FRREUHLLHUERR
FBR10D5BM+3,-1FRREUHLLHUERRFBM+8
,+4U8D3L2R4BM+3,+5U8D4R3FD3BM+3,
-3ERRFDL4U2D4FRRE"
```

6809 SYSTEM DEVELOPMENT



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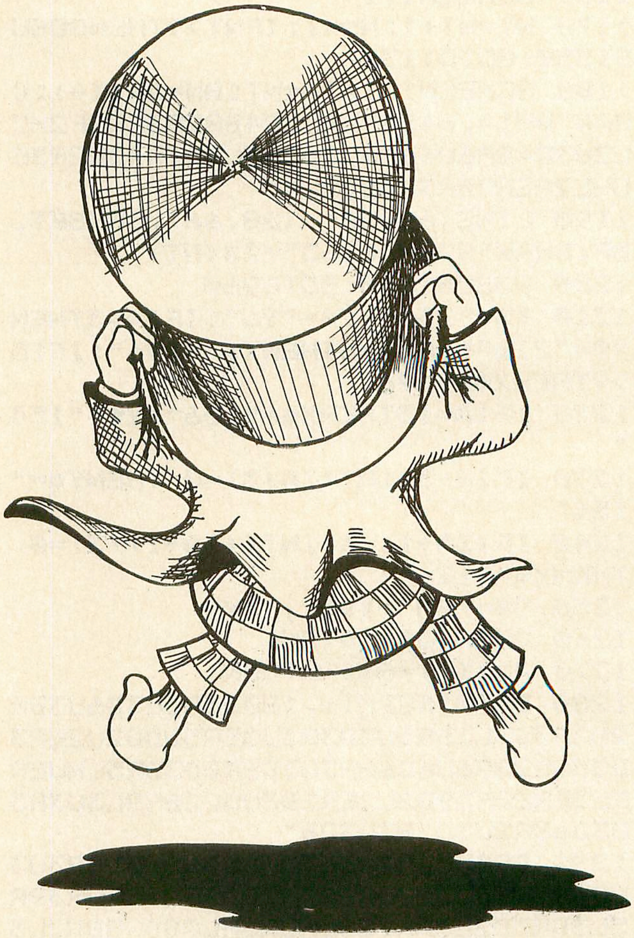
```
820 DRAW"BM10,30D3F2RE2U3BM+3,+5
U4ER3D5UFL3BR7U8BR3BD3D4FRRRU5BM
+3,+2UERRFDL4U2D4FRREBR7U3ERRFD3
GLLHBM+7,+1U7FERLGDDL2R4"
830 DRAW"BM+9,+4U8D3L3R4BM+3,+5U
8D3R3FD4BM+3,+0U5BM+0,-2UBM+7,+3
HLLGDFRRFDGLLHBM+10,+0FRREUHLLHU
ERRFBM+3,-1D4FR3U5D8GBM+4,-4U5DE
RFD4U4ERFD4BM+3,+0U8D3R3FDDGL3BM
+8,+0HUUERRFDDGLLBM+8,+0LU8"
840 DRAW"BM+6,+1ERRFDDLGDBD2D"
850 TIMER=0
860 NM=1:NE=0:LINE(158,130)-(256
,131),PSET,B
870 SCREEN1,1:FORI=1TO13:IFAR(I)
<0THEN1020
880 IFI=1 THEN910
890 FORJ=1 TO I-1:IFAR(I)=AR(J)T
HEN 1020
900 NEXTJ:NE=NE+1
910 Z=AR(I):LX=152:LY=21:LINE(18
0,20)-(240,45),PRESET,BF:GOSUB63
0
920 GOSUB1450:IFSA=0 THENGN=AR(I
):Q$=STR$(GN):GOTO960
930 GOSUB1520:FORW=1TO9:IFVAL(Q$
)=W THEN950ELSENEXTW
940 IFQ$="Q"THEN1540ELSEIFQ$="S"
THEN1132
945 IFQ$="C"THEN790ELSEIFQ$<>"0"
THEN920
950 GN=VAL(Q$):N=GN+1:Q$="V30;O4
;L20;"+STR$(N):PLAY"XQ$;"
960 DRAW"S3BM200,45"+Z$(GN)
970 IFI=1THEN1000
980 FORIA=1 TO I-1:IFGN=AA(IA)TH
ENGOSUB1280:GOTO920
990 NEXTIA
1000 FORIA=I TO 13:IFAR(IA)=AR(I
)THENGOSUB1210
1010 NEXTIA
1020 NEXTI
1030 FORZ=1TO13:IFAA(Z)<0THENAA(
Z)=0
1040 NEXTZ
1050 A1=AA(1)+AA(4)*10+AA(7)*100
+AA(10)*1000
1060 A2=AA(2)+AA(5)*10+AA(8)*100
+AA(11)*1000
1070 A3=AA(3)+AA(6)*10+AA(9)*100
+AA(12)*1000+AA(13)*10000
1080 GOSUB1470:IF A1+A2<>A3 THEN
1140
1090 DRAW"S7BM150,186U3R3D3L3R3D
3LBM+3,-3U3R3D3L3BR5U3R3D3L3BR8L
3U3R3U3D6BR6R3U3L3U3R3BD6BR2U3R3
D3L3BR6U6D6BR3U3D3R3U3D3BR3U6D3L
2R4BD3BR2U3D3BR2U3R3D3L3BR5U3DER
2FD3"
1100 SCREEN1,1:GOSUB1460
1110 IFSA=0THENSA=1:GOSUB1520:GO
TO1130
1120 GOSUB1560:CLS3:T=TIMER:PRIN
T@133,"YOUR SOLUTION TIME WAS";:
PRINT@170,INT(T/3600);"MIN";INT(
INT(T/6-INT(T/3600)*600+.5)/10);
"SEC";:PRINT@229,"AT DIFFICULTY
LEVEL ";DL;:PRINT@295,"WITH ONLY
 ";CL;" CLUES";:GOSUB1460:SCREEN
1,1
1130 GOSUB1480:PCLS:TIMER=0:NM=1
:NT=0:CL=0:GOTO340
1132 SOUND8,1:DRAW"S8BM165,183L3
DR3D2L3BR5U4DLR2BR2BDGDREDU2LBRB
D2RBR2U3DEGDDU2BR3RRLU2D4BR8EUHL
GDFRBR4HU2BR3DGGBR5HUEFDL2FREBR2
BDU3DE":GOSUB1460:GOTO1160
1140 'BAD SOLUTION
1150 SOUND2,4:DRAW"S8BM180,183D3
RU2D2RU3BR2D3U3R2FGL2R2FBR2BU3R3
```

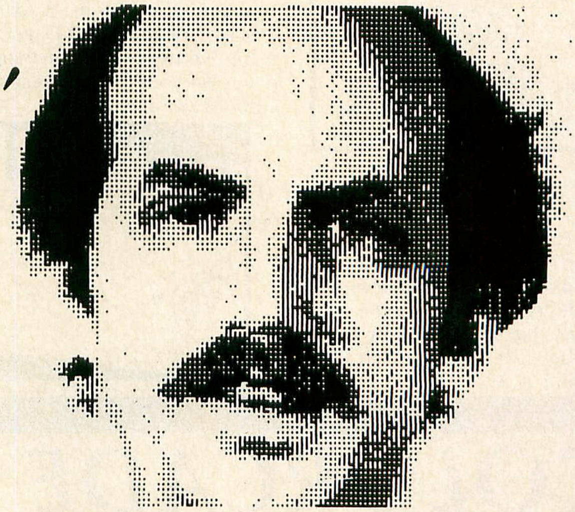


```
D3L3U3BR5D3U3F3U3BR5L3D3R3UL":GO
SUB1460
1160 SCREEN1,1
1170 NT=NT+1:NM=1:IFNT>9THENGOSU
B1550:GOTO1130
1180 SCREEN1,1:IA=NT:GN=AR(IA):D
RAW"BM14,64S6DU4L2R4BR2R3FDGF2H2
L3U3D4BR6U4BR6L4D2R3L3D2R4BR2R3E
UHL2HER3BR3R4BD2L4"
1190 LINE(65,50)-(88,66),PRESET,
BF:DRAW"S2BM66,65"+Z$(NT)
1200 GOSUB1530:GOTO860
1210 X$="236":Y$="96":IFIA>3THEN
X$="216":IFIA>6THENX$="196":IFIA
>9THENX$="176"
1220 IFIA=13THENX$="156":Y$="154
"
1230 IFIA-3*INT(IA/3)=0 THENY$="
154"
1240 IF(IA+1)-3*INT((IA+1)/3)=0
THENY$="126"
1250 Q$="BM"+X$+","+Y$
1260 DRAW Q$+Z$(GN)
1270 AA(IA)=GN:RETURN
1280 DRAW"S8BM10,180D3R3U3D6U3BR
2U3R3D3L3BR5U3D3R3U3BR5BDD2U2ER3
D3UGL2BR6U6D6BR3U3DERBD3BR5LHUER
FL3FREBR3BD2U2ER2D3UGL2BR8L3U3R3
U3D6BR2U3D3R3U3D6"
1290 DRAW"BR7U6L3D3R3BR2U3D3R3U3
BR3BURFDL3EGDFREBR2BDR3U2L3UR3BR
5L3DR3D2L3BR7EGLHUR3HLGDBR8BU2L3
D3R3U6BR7D6U3L2R4BR2R3D3BL2U6D6B
R4U2ER2D3UGL2BR6U6D3L2R4"
1300 GOSUB1460:LINE(10,170)-(256
,191),PRESET,BF
1310 RETURN
1320 SCREEN1,1:GOTO1320
1330 'NOS DEFINED
1340 Z$(0)="S3BR2H4U14E4R8F4D14G
4L8"
1350 Z$(1)="BR9R6L3U21G6"
1360 Z$(2)="BR18L14U4E4R6E4U4H4L
8G6"
1370 Z$(3)="BE4F4R6E4U4H3L4R4E3U
4H3L6G4"
1380 Z$(4)="BR10U24BL2D2M-8,+14R
16"
1390 Z$(5)="BR2R4E10U2H3L9U8R14"
1400 Z$(6)="BR3BE3F3R6E4U6H4L8D8
U16E3R6"
1410 Z$(7)="BR7M+11,-23L14"
1420 Z$(8)="BR6H2U8E2R14F2D8G2L1
4BU12R2H2U8E2R10F2D8G2"
1430 Z$(9)="BR10M+8,-12U9H3L9G3D
9F3R12"
1440 RETURN
1450 LINE(179,25)-(220,45),PRESE
T,BF:RETURN
1460 FORMM=1TO1000:NEXTMM:RETURN
1470 FORMM=1TO13:AA(MM)=-1:NEXTM
M:RETURN
1480 PRINT@352," ENTER DIFFICULT
Y LEVEL (1,2,3) ";:SA=1
1490 Q$=INKEY$:IFQ$=""THEN1490EL
SEDL=VAL(Q$)
1500 IFDL<1 OR DL>3THEN1490
1510 PRINT@432,DL;:RETURN
1520 Q$=INKEY$:IFQ$=""THEN1520EL
SERETURN
1530 LINE(154,70)-(256,191),PRES
ET,BF:RETURN
1540 CLS4:GOSUB1580:PRINT@128,"
   MAYBE THAT WAS TOO HARD,     *
******LET'S  TRY AGAIN.*********"
:GOTO1130
1550 CLS7:GOSUB1570:PRINT@133,"I
 ONLY ALLOW 9 TRIES.";:PRINT@197
,"BETTER LUCK NEXT TIME.";:RETUR
N
1560 FORMM=1TO3:PLAY"O4;L255;V31
;1;2;3;4;5;6;7;8;9;10;11;12;11;9
;7;5;3;1":NEXTMM:RETURN
1570 PLAY"L255;O5;V31;12;11;10;9
;8;7;6;5;4;3;2;1;O2;12;11;10;9;8
;7;6;5;4;3;2;1":RETURN
1580 FORMM=1TO3:MK=RND(255):SOUN
DMK,1:NEXTMM:RETURN
1590 PCLS
1600 CIRCLE(12,12),11:CIRCLE(12,
12),6,0,.9,.1,.35:DRAW"BM9,8D2LU
2RBR6D2RU2L"
1610 GET(0,0)-(24,24),M1,G
1620 PUT (100,100)-(124,124),M1,
PSET
1630 DRAW"BM25,23M32,9M40,16M25,
23BM28,22U7R12L4D3U7L6BM32,9D11L
6BM30,12HUUEUERRERRFRRF4D5GDDGDU
3":POKE178,13:PAINT(32,8),,0:POK
E178,0
1635 GET(25,1)-(49,25),M2,G
1640 DRAW"BM57,25E2U2H3U2HU2EU2E
U4F2EURER5FRF2D4R4ERFG5L7E5U3HL2
GD6U5HL2GD7GDHFR10E4UBM66,25H3U2
E3BL5BGH2U2E2BR6UBR4U"
1642 POKE178,154:PAINT(73,12),,0
:POKE178,0
1645 GET(53,1)-(77,25),M3,G
1646 PUT(140,101)-(163,124),M3,P
SET
1650 DRAW"BM113,8RE2R3F3DF2D4GDG
2DGL4HGL4HUH2UHU4EUE3R3F2RM-3,-6
L2M+5,+6BH3HL3G3LHDF4RE3U":POKE1
78,17:PAINT(113,18),,0:POKE178,0
1655 GET(101,1)-(125,25),M4,G
2000 RETURN
```

TALKHEAD

FOR THE 'REAL TALKER'

"Way beyond anything you have ever seen for the CoCo"



That's a strong statement, we know. But wait until you see 'TALKHEAD'! It's a dazzling creation—easily the most impressive display of CoCo graphics you can buy!

If you have a 'REAL TALKER' voice synthesizer, DO NOT deprive yourself of this absolutely incredible Talking Head simulation program! TALKHEAD uses the 'Real Talker' and extremely high speed/high resolution machine language to create an audio-visual simulation that clearly goes way, way beyond anything that you have ever seen on ANY home computer!

TALKHEAD's fast, smooth-talking animation is so stunningly life-like that it resembles a movie more than a cartoon! This page shows some still shots of the actual moving image as it will appear on your TV screen.

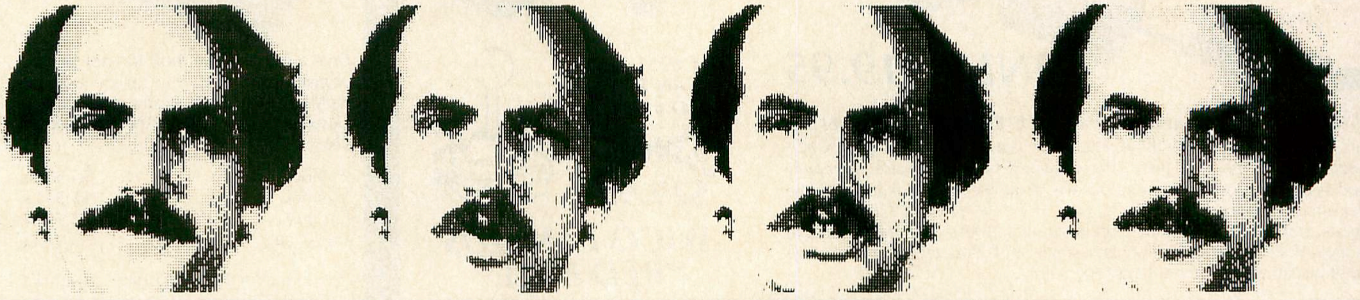
And, TALKHEAD is a real snap to use in Basic, thanks to a new command that we give you: SAY. Type SAY "ANYTHING YOU WANT" and Talkhead instantly appears and speaks ANY text—it has an unlimited vocabulary!

The most impressive CoCo program you can buy . . .

'TALKHEAD' is available on cassette or disk (please specify) for ***only $29.95.*** The cassette version can be transferred to disk in case you ever upgrade. TALKHEAD requires 64K of memory and a Colorware 'REAL TALKER' voice pak.

ONLY $29.95 FROM COLORWARE

PROGRAM BY TIM JENISON SPEECH PROGRAMMING BY H. PUNYON



'TALKHEAD's eyes, mouth and jaw move, realistically animating his speech. The effect is amazing!

MORE SOFTWARE FOR THE 'REAL TALKER' VOICE PAK

STELLAR SEARCH ADVENTURE

If you ever had an urge to command the USS Enterprise, this talking version of 'STELLAR SEARCH' from Owl-Ware is for you! It uniquely combines the best aspects of 'adventure' and graphic 'action' type games and puts the 'Real Talker' voice pak to good use. You'll find graphics galore in this exciting package containing more than 86K of action adventure. Requires 32K and a 'Real Talker' voice pak. ***Cassette....$24.95. Disk....$26.95***

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Spelling Tester	**$ 9.95**
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Requires 16K and a Colorware 'Real Talker' voice pak.

ADVENTURE STARTER

The popular 'ADVENTURE STARTER' from Owl's Nest Software is now available in a speaking version for the 'Real Talker' voice tynthesizer. Adventure Starter is a painless and enjoyable way to learn about computer adventure games. Included are two adventures. The first is "MYHOUSE", an easy game with plenty of help and hints. A second adventure, 'PIRATES', is more challenging. Both are great fun for the adventure minded. This is the only way to get into CoCo adventuring! Requires 16K Extended Basic and a 'REAL TALKER' voice pak. ***Cassette, only $17.95.***

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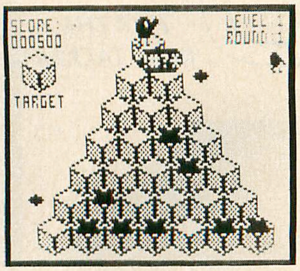
ALL SOFTWARE ON THIS PAGE REQUIRES A COLORWARE 'REAL TALKER' VOICE PAK.

THE TOP 4 COCO GAMES...

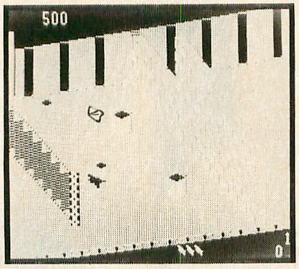


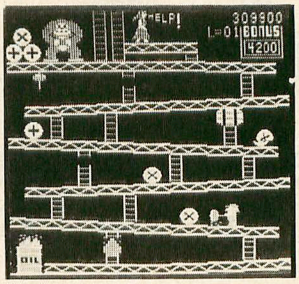
CUBIX

By Spectral Associates. Very much like the arcade smash! Jump little Cubix around the 3D maze trying to change the color of all the squares. With Death Globes, Discs, Snakes, etc. 32K Tape: $24.95

ZAKSUND

From Elite Software comes this fantastic arcade style space action game with 3 different stages of moving 3-D graphics. You've never seen anything like this on your CoCo! Great sound too! 32K Tape: $24.95



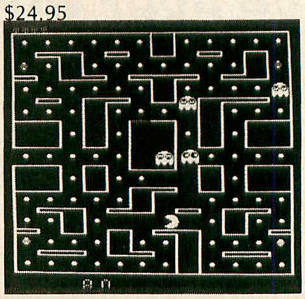


THE KING

Previously called 'Donkey King', you simply cannot buy a more impressive game for your CoCo. With 4 different screens and loads of fun! From Tom Mix Software. 32K Tape: $25.95

GHOST GOBBLER

From Spectral Assoc. This "PAC" theme game has been improved several times. It is definitely the best of its type. Brilliant color, action and sound, just like an arcade. 16K Tape: $24.95



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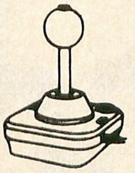

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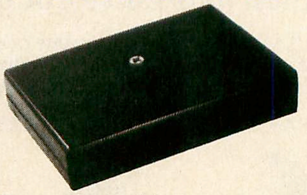

Give a professional look to your project or product! High quality 3 piece injection molded plastic with spring loaded door. Designed especially for the CoCo ROM slot.

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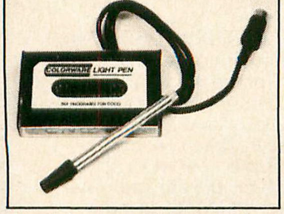

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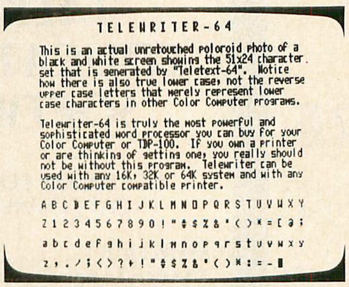
The Colorware Light Pen plugs directly into your joystick port and comes with six fun & useful programs on cassette. Easy instructions show how to use it with Basic and it's compatible with light pen software such as Computer Island's "Fun Pack." Order yours today. Only $19.95 complete.

TELEWRITER-64



```
TELEWRITER-64

This is an actual unretouched poloroid photo of a
black and white screen showing the 51x24 character
set that is generated by "Teletext-64". Notice
how there is also true lower case, not the reverse
upper case letters that merely represent lower
case characters in other Color Computer programs.

Telewriter-64 is truly the most powerful and
sophisticated word processor you can buy for your
Color Computer or TDP-100. If you own a printer
or are thinking of getting one, you really should
not be without this program. Telewriter can be
used with any 16K, 32K or 64K system and with any
Color Computer compatible printer.

A B C D E F G H I J K L M N O P Q R S T U V W X Y
Z 1 2 3 4 5 6 7 8 9 0 ! " # $ % & ' ( ) * = [ @ ;
a b c d e f g h i j k l m n o p q r s t u v w x y
z , . / ; < > ? + ! " # $ % & ' ( ) * : = - █
```

DISK $59.95

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Colorware researched the word processors available for the Color Computer. This is the best. Telewriter-64 is a truly sophisticated system that is marvelously easy to use. It works with any 16K, 32K or 64K system and any CoCo compatible printer.

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PHONETIC SPEECH DICTIONARY for the SC-01 SPEECH SYNTHESIZER

THINKING OF BUYING A COCO VOICE SYNTHESIZER?

READ THIS....

Making your computer talk couldn't be any easier! 'Real Talker' is a full featured, ready to use, HARDWARE voice synthesizer system in a cartridge pak. It uses the Votrax SC-01 phoneme synthesizer chip to produce a clear, crisp voice.

FREE TEXT-TO-SPEECH

Included free with 'Real Talker' is Colorware's remarkable Text-to-Speech program. This is a truly powerful machine language utility. What it does is automatically convert plain English to speech. And it has an unlimited vocabulary! For example, use it in the direct mode: Type in a sentence or a paragraph, even mix in numbers, dollar signs, etc., then press enter. The text is spoken. At the same time a phoneme string is generated which can be saved to cassette or disk, modified or used in a Basic program.

We originally planned to sell this major piece of programming for about $40.00 but decided it was so useful that no 'Real Talker' user should be without it. Besides, it really shows off the capability of 'Real Talker'.

Also included with 'Real Talker' is our unique Phoneme Editor program. It allows you to explore and create artificial speech at the phoneme level. Phenomes are the fundimental sounds or building blocks of word pronunciation. There are 64 different phenomes, as well as 4 inflection levels at your disposal. Creating and modifying speech at the phenome level is both fascinating and educational. The Phenome Editor may also be used to customize the pronunciation of speech produced by the Text-to-Speech program.

You don't have to use any of our utility programs though. If you write your own Basic Programs, you will find the pocket sized Votrax Dictionary (included free) is all you need to make your own Basic programs talk. This dictionary gives you quick access to the phenome sequences used to create approximately 1400 of the most used words in the English language.

How about compatibility? 'Real Talker' is compatible with any 16K, 32K, 64K, Extended or non-extended Color Computer. It works with any cassette or disk based system, with or without the Radio Shack Multi-slot expander. No other synthesizer under $100 can make this claim. Most other CoCo voice synthesizers require an expensive Multi-slot expander in order to work with the disk system. 'Real Talker' requires only an inexpensive Y-adapter. This is an important consideration if you plan on adding a disk or have one already.

'Real Talker' comes completely assembled, tested and ready to use. It is powered by the CoCo and talks through your T.V. speaker so there is nothing else to add. Price includes Text-to-Speech and other programs on cassette (may be transferred to disk), User Manual and Votrax Dictionary. ONLY $59.95

'Y-BRANCHING CABLE' For disk systems. This 40-pin, 3 connector cable allows 'Real Talker' to be used with any disk system $29.95

YOU DECIDE....

Order yours today on our Toll-Free Order Line. If you are not delighted with your 'Real Talker' system, simply return it within 30 days for a prompt, courteous refund.

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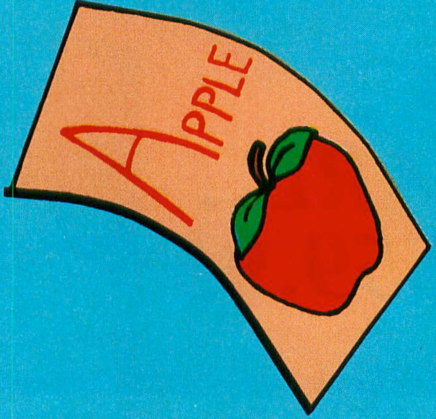
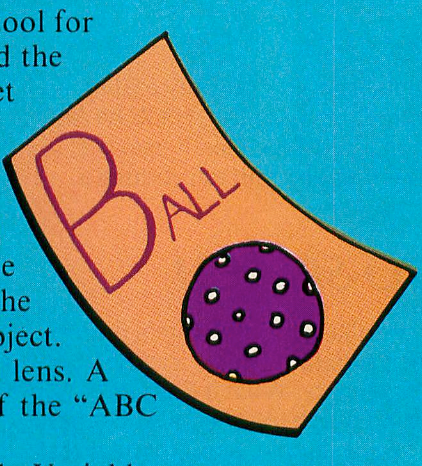
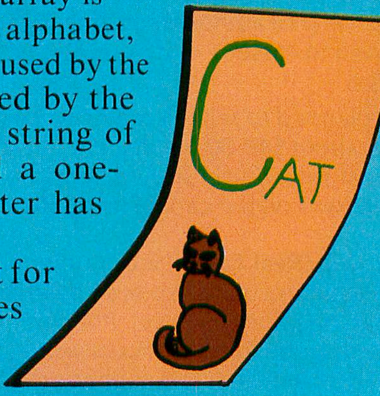
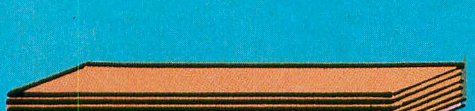
16K
ECB

The









Game

By James F. Taylor

When I purchased my Color Computer, one of the major uses I envisioned was as a learning tool for my pre-school son. So, as soon as I learned the rudiments of graphics programming on the CoCo, I set out to teach it to my child. This program is a result of that effort.

The general idea behind the program is an interactive early reader. A picture of an object is displayed with its name written beneath. At the bottom of the screen is a pair of spectacles, and in the left lens of the spectacles appears the first letter of the name of the object. The child simply has to match the letter in the left lens. A correct response is rewarded with two measures of the "ABC Song." An incorrect response gets "the raspberries."

Program execution is relatively straightforward. Variables are initialized, and the controlling array is loaded from data. The array is two dimensional. It represents a table which is 26 rows long, the alphabet, and four columns wide. The four parts are: The string, which is used by the BASIC *DRAW* command to draw the letter; the string used by the *DRAW* command to draw the corresponding picture; a string of numbers which represents the letters in the word; and a one-character flag, which denotes whether the particular letter has been previously used.

The title screen is then displayed with the entire alphabet for an ABC Song sing-along, and the program then moves directly into the main interactive routines. The letter to be displayed is chosen in Lines 145 to 153. To prevent the

(James Taylor is a warrant officer in the U.S. Coast Guard and is currently working to implement the Coast Guard's automated pay system at their new Pay and Personnel Center in Topeka, Kan. He previously managed Wang word processing/office automation systems for the Seventh Coast Guard District in Miami, Fla.)

game from getting repetitive, all letters must be used once before any are repeated. A random number is generated to point to the subscript with the appropriate data. If the fourth data element indicates that the letter is free (F), it is marked used (U) and control is returned to the display. If the letter is found to have been used, the list is scanned from the top for the first available letter. If none are found free, the list is reinitialized to free (F) and the random number generated is returned to the display routine.

The display routine uses the data elements to determine the length and letters in the word, and centers and draws the word on the screen. It then draws the picture and the letter in the spectacles. The display is erased by simply redrawing everything in the background color.

If your child tires of the content of the program, you can replace the picture and word elements of the data statements with your own. Each letter of the word is represented as a two digit number. For example, "FROG" would be represented as "06181507" with "06" representing the sixth letter of the alphabet, F.

Well, I hope this program helps your kid(s) as much as it has mine. Not only can my son quickly identify (and write) all the letters, but he has also learned to spell most of the words in the program. Also, he has learned how to run the program, and he is now a pre-school touch-typist. I think I might be exaggerating just a little.

180	48	1000	169
410	209	1060	200
530	234	1130	128
681	250	1200	198
820	103	END	136

```
1 '*****************************
2 '*     A B C   G A M E       *
3 '*       (C)   1983          *
4 '*          BY               *
5 '*     JAMES F. TAYLOR       *
6 '*      P. O. BOX 208        *
7 '*    MERIDEN, KS  66512     *
8 '*    PH:(913) 484-2778      *
9 '*****************************
10 '
90 CLEAR 500
100 Q1$="70":Q2$="125"
110 A1$="166":A2$="125"
120 P1$="60":P2$="40"
130 RN=RND(-TIMER)
140 DIM D$(26,4)
145 '
150 '***************************
160 '* Load controlling array  *
170 '* from data statements    *
180 '***************************
185 '
190 CLS3
200 FOR I=1 TO 26
210 FOR J=1 TO 4
220 READ D$(I,J)
230 PRINT@RND(500),"ABCGAME";
240 NEXT J
250 NEXT I
260 GOSUB 690' Draw title screen
270 GOSUB 850' Play ABC Song
275 '
280 '***************************
290 '* Draw Playing Screen      *
300 '***************************
305 '
310 PMODE4,1:COLOR5,0:PCLS:SCREE
N1,1
320 FOR I=30 TO 40 STEP 10
330 CIRCLE(80,140),I
340 CIRCLE(176,140),I
350 NEXT I
360 PAINT(115,140),5,5
370 PAINT(211,140),5,5
380 DRAW"BM120,140E5R7F5"
390 DRAW"BM120,145E5R7F5"
400 PAINT(128,138),5,5
410 GOSUB 920' Get letter
411 '***************************
412 '* Determine draw position *
413 '* of current word in play *
414 '* and draw on screen      *
415 '***************************
420 WL=LEN(D$(RN,3))/2:PW=WL*14:
PS$=STR$(154-PW)
430 DRAW"C5S6BM"+PS$+",70"
440 FOR I=1 TO WL*2 STEP 2
450 L=VAL(MID$(D$(RN,3),I,2)):DR
AW D$(L,1)
460 NEXT I
461 '***************************
462 '* Draw picture & first    *
463 '* Letter of word          *
464 '***************************
470 DRAW"S8BM"+Q1$+","+Q2$+D$(RN
,1)
480 DRAW"BM"+P1$+","+P2$+D$(RN,2
)
481 '***************************
482 '* Get response and verify *
483 '***************************
490 IN=0
500 A$=INKEY$:IFA$=""THEN500
510 IN=INSTR(1,"ABCDEFGHIJKLMNOP
QRSTUVWXYZ",A$)
520 IF IN THEN DRAW "C5S8BM"+A1$
+","+A2$+D$(IN,1):GOTO 560
530 IN=INSTR(1,"abcdefghijklmnop
qrstuvwxyz",A$)
540 IF IN THEN DRAW "C5S8BM"+A1$
+","+A2$+D$(IN,1):GOTO 560
550 GOTO 500
560 IF IN=RN THEN 600
561 '***************************
562 '* Process incorrect re-   *
563 '* with 'Raspberrys & erase*
564 '***************************
565 '
570 PLAY "O2L100FFFFFFFO1AAAAAAA
O2FFFFFFF"
580 DRAW "C0BM"+A1$+","+A2$+D$(I
N,1)
590 GOTO 490
591 '
592 '***************************
593 '* Process correct response*
594 '* & erase all             *
595 '***************************
596 '
600 PLAY "O3L4CCGGAAL2G"
610 DRAW"S8C0BM"+Q1$+","+Q2$+D$(
RN,1)
620 DRAW"C0BM"+P1$+","+P2$+D$(RN
,2)
630 DRAW"C0S8BM"+A1$+","+A2$+D$(
IN,1)
640 DRAW"S6C0BM"+PS$+",70"
650 FOR I=1 TO WL*2 STEP 2
660 L=VAL(MID$(D$(RN,3),I,2)):DR
AW D$(L,1)
670 NEXT I
680 GOTO 410
681 '
682 '***************************
683 '* Draw title screen       *
684 '***************************
685 '
690 PMODE3,1:COLOR2,3:PCLS:SCREE
N1,0
700 DRAW"BM10,10;ND172R234D172L2
34BG10U191R255D191L255"
710 PAINT(115,5),4,2
720 DRAW"C1S10BM44,30"+D$(1,1)+D
$(2,1)+D$(3,1)
730 DRAW"BM78,75"+D$(7,1)+D$(1,1
)+D$(13,1)+D$(5,1)
732 DRAW"BM82,115"+"S4"+"BR4G4D6
F4BR5BU14"+D$(3,1)+"F4D6G4BR9BU1
4"
733 DRAW"S4BR5NG3D14NL2R2BR3BU4;
F4R2E4U6H4L2G4F4R2E4;BR5F3NR2G3F
4R2E4H3E3H4L2G4BR15BD10BU7NU7R8N
R2NU7D7"
740 DRAW"C2S4BM37,145"
750 FOR I=1TO26
760 DRAW D$(I,1)
770 IF I=13 THEN DRAW"BM37,165"
780 NEXT I
790 FOR I=43TO208 STEP 15
800 CIRCLE (I,135),15,1,.3:PAINT
(I+10,135),2,1
810 NEXT I
820 CIRCLE (190,40),15,2:PAINT(1
90,40),2,2
830 DRAW "BM190,40;NU21NE25NR21N
F25ND21NG25NL21NH25"
840 RETURN
841 '
842 '***************************
843 '* Play opening ABC song   *
844 '***************************
845 '
850 PLAY"L4CCGGO3AAL2GP255"
860 PLAY"L4O3FFEEL8DDDDL2CP255"
870 PLAY"L4O3GGFFEEL2DP255"
880 PLAY"L8O3GGL3GP255L2FL4EEL2D
P255"
890 PLAY"P255L4O3CCGGO3AAL2GP255
"
900 PLAY"P255L4O3FFEEL2DDC"
910 RETURN
911 '***************************
912 '* Generate next letter &  *
913 '* prevent repeats         *
914 '***************************
915 '
920 RN=RND(26)
930 IF D$(RN,4)="U" THEN 950
940 GOTO 990
950 FOR I=1 TO 26
960 IFD$(I,4)="F"THENRN=I:GOTO99
0
970 NEXT I
980 FOR I=1 TO 26:D$(I,4)="F":NE
XT
990 D$(RN,4)="U"
1000 RETURN
1001 '
1002 '**************************
1003 '*      D  A  T  A         *
1004 '* Elements are:           *
1005 '*  LETTER DRAW STRING     *
1006 '*  PICTURE DRAW STRING    *
1007 '*  LETTERS IN WORD(1-26)  *
      *  INITIAL 'FREE' FLAG    *
1008 '**************************
1009 '
1010 DATA "BD14U8NR10U2E4R2F4ND1
0BU4BR4","S5R20E10R70D10E12H12D1
0L70H10L20F12G12","0118181523","
F"
1020 DATA "ND14R8F2D2G2NL8F2D4G2
NL8BU14BR6","S3BR55BD20R50U50L50
ND50E20R50NG20D50G20","021215031
1","F"
1030 DATA "BR10BD4U2H2L6G2D10F2R
```

```
6E2U2BU10BR4","S4R50E15R40D15R20
F5D15L10H5L10G5F7R5E7BL20L68H5L1
0G5F7R5E7BL20L3H5U10H5BR55E12R32
D12L42","030118","F"
1040 DATA "D14R6E4U6H4L6BR14","S
3BR35R50E5R30F5R15D2L15G5L30H5L5
0U2BR5U20R20F20BD2G20L20U20","04
011820","F"
1050 DATA "NR10D7NR6D7R10BU14BR4
","S4BR60BU30ND50R30D50NR10L40BR
6U54R38D54BL14BU35U10L10D10R10BD
10E2F2G2H2","0524092O","F"
1060 DATA "NR10D7NR6D7BU14BR14",
"S4BR50BU25U2R3U7L7D7R3D50R2U50R
20D15L20BD15R50U5NL50U5NL50U5NL3
0U5NL30U5NL30U5NL50","06120107",
"F"
1070 DATA "BR10BD2H2L6G2D10F2R6E
2U2NL4BU10BR4","S6BR10BD10E20U3E
3H5E3F5NG3R5E3R20F3R20E5F5NL10D5
L30D4G4D4G5L10H5U4NR20BR3D3F4R6E
4U3L20BR10D4R2U4L12D16L27","0721
14","F"
1080 DATA "D8ND6R10ND6U8BR4","S4
BR55BU30ND50R30D50R10D4L50U4R40B
U5L30","080120","F"
1090 DATA "BR2R6L3D14L3R6BU14BR6
","S2BR120BU50D10F5D15F5D30F5ND5
E5U15E5U10E5U30R30D90L80U90R70BU
10R20D110L105U110R85","090309031
205","F"
1100 DATA "BD10D2F2R6E2U12BR4","
S3BR70BU20R30H30R20F30R20F7NR15B
L70U2L15D4R15U2BR40D4R20U8L20D4B
R30G7L20G30L20E30L30G15L13E15NL2
0U3NL30U3NL35U3NL30U3NL20U3H15R1
3F15","100520","F"
1110 DATA "D14U8R4E6G6F6D2BU14BR
4","S3BR50BU10E40ND80F40NL80G40H
40L10E5L10F10L10E5L20E5L10F10L10
E5L20E5L10F10L10E5L20","11092005
","F"
1120 DATA "D14R10BU14BR4","S4BR5
9BU25D50R5U10R10BU3L10U10R10BU3L
10U10R10BU3L10U10R10BU3L10U10L5N
D20BR15D10BD3D10BD3D10BD3D10BD3D
10R5U62L5","120104040518","F"
1130 DATA "ND14F5E5ND14BR4","S3B
R80BU30NR40D60R40U60BD10R20D40L2
0BU7R13U26L10","132107","F"
1140 DATA "ND14D2F10D2U14BR4","S
3BR70BU40D10F50D7G5L20H5L10G5NR2
0L5H5U10E5","14151905","F"
1150 DATA "BD2D10F2R6E2U10H2L6G2
BU2BR14","S4BR60BU30D5L5D40R40U4
0L5NL30U5L30BD10D20R29U20L29BR5B
D5D10R19U10L19BU15D3BR5U3BR5D3BR
5U3BR5D3BD10BL5L10","15220514","
F"
1160 DATA "ND14R8F2D4G2L8BU8BR14
","S3BD30BR100L41H10U30E10H5G5H3
E5R55G8F8D30G10BE10R17U30L17BD4R
11D22L11","160920030B0518","F"
1170 DATA "BR2NR6G2D10F2R6E1NF1N
H2E1U10H2BR6","S4BR30BD20R20E20N
U5E3NU7E3NU9E3NU10E3NU10E3NU10E3
NU8E3NU6E3NU3E3F2G3NR3G3NR6G3NR8
G3NR10G3NR10G3NR10G3NR9G3NR7G3NR
5G10D5L7G3","1721091212","F"
1180 DATA "D14BR10U6H2NL8E2U2H2N
L8BR6","S2BR20NR150U5R150BE30ND1
5G7ND15G10ND15G7ND15G10ND15G7ND1
5G10ND15G7ND15","18011105","F"
1190 DATA "BD12F2R6E2U3H2L6H2U3E
2R6F2BU2BR4","S2BR120BU55R40F30D
30G30L40H30U30E30BF5R35F26D27G27
L35H27U27E26BD35BD12BL15S3F2R6E2
U3H2L6H2U3E2R6F2BU2BR4R5ND12R5BR
4BD2D10F2R6E2U10H2L6G2BU2BR12ND1
2R8F2D4G2L8","19090714","F"
1200 DATA "R5ND14R5BR4","S3BR50B
D20R60U20H10L5U5L5D5L25U5L5D5L5G
10D20BU20BL5NL20U12R17BR7R22BR7R
18D12R20U10H10L93G10D10","200512
05160B151405","F"
1210 DATA "D12F2R6E2U12BR4","S4B
R80BU20D40L40U10NH10R10NH10U10NH
10R10NH10U10NH10R10NH10U10NH10R1
0H10L10D10L10D10L10D10L10D10F10B
H25E20NL10ND10","2116","F"
1220 DATA "D9F5E5U9BR4","S4BR110
BU20NF15D5F10R5D20L10H5L10G5L40H
5L10G5L10U30E5R80BG5F10L25U10R15
BL25D10L20U10R20BL25D10L20U10R20
BD30BL20F5R10E5BR40F5R10E5","220
114","F"
1230 DATA "D14E5F5U14BR4","S5BR4
0BD15U15NR10BU3NR10U15R10ND15BR4
ND15R10D15NL10BD3NL10D15L10NU15B
L4NU15L10BG5U40R33D40L33","23091
4041523","F"
1240 DATA "D2F10D2BL10U2E10U2BR4
","S4BR60BU30ND50R30D50NR10L40BR
6U54R38D54BL14BU35U10L10D10R10BD
10E2F2G2H2","0524092O","F"
1250 DATA "F5ND9E5BR4","S4BR110D
20L70H20R90BL20H10L30G10BR8BU3NE
5R30U5L25BU2E5NE5R15F5BD12BL40S3
F5NE3NG3F10E5H3BF3G8H3","2501030
820","F"
1260 DATA "BD14NR10U2E10U2NL10BR
4","S3BR65BU40F5NG5F5NG5F5NG5F5N
G5F5NG5F5;L5D15R10U15L5BD12BL3U5
R6D5L6BR3BD3;NL5NR5D5NL5NR5D5NL5
NR5D5NR5NL5D5NL5NR5D5NL5NR5D5NL5
NR5D5NL5NR5;BU45E5NF5E5NF5E5NF5E
5NF5E5NF5E5NF5","260916160518","
F"
```

NEW GOOD STUFF FOR EVERY COLOR COMPUTER

MAGIGRAPH

Turn your Color Computer into a graphic design center with the ease of a keystroke! **MagiGraph** makes it simple to create highly detailed figures up to and including an entire high-resolution screen. Designed for those with some experience in Basic and Assembly Language programming, **MagiGraph** includes lots of special features:

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- **Versatile I/O routines** store a graphic screen on cassette or floppy disk; recall it later for use by another program or revise it with **MagiGraph**.

If you're looking for the finest graphic development utility available for your Color Computer, THIS IS IT. Maximize your machine's potential, while you push your imagination to the limit — with **MagiGraph**!

By Kevin Dooley. Cassette **$34.95** (16K required); Disk **$39.95** (32K Extended Color BASIC required); Amdisk cartridge **$44.95**.

CSPOOL
Color Computer Print Spooler

Stop Waiting Around for the Printer! **CSPOOL** allows you to use your printer and computer concurrently, takes only 26 bytes of Color Basic's memory, and gives you 32K of print buffer. It's like having two computers in one! By intercepting characters sent to the printer and storing them in the upper 32K of RAM, **CSPOOL** allows you to run other programs while your printer is doing its job. **CSPOOL** is FREE with the purchase of a 64K RAM *UPGRADE KIT from* The Micro Works, or it may be purchased separately on cassette or diskette for **$19.95**. Requires 64K; not for FLEX or OS9.

64K MEMORY UPGRADE KIT: For Rev. levels E, ET, NC, TDP-100s, and Color Computer II. Eight prime 64K RAM chips, instructions, and CSPOOL: **$64.95.**

SYSTEMS SOFTWARE

MACRO-80C: DISK-BASED EDITOR, ASSEMBLER AND MONITOR—With all the features the serious programmer wants, this package includes a powerful 2-pass macro assembler with conditional assembly, local labels, include files and cross referenced symbol tables. MACRO-80C supports the complete Motorola 6809 instruction set in standard source format. Incorporating all the features of our Rompack-based assembler (SDS-80C), MACRO-80C contains many more useful instructions and pseudo-ops which aid the programmer and add power and flexibility. The screen-oriented editor is designed for efficient and easy editing of assembly language programs. MACRO-80C allows global changes and moving/copying blocks of text. You can edit lines of assembly source which exceed 32 characters. DCBUG is a machine language monitor which allows examining and altering of memory, setting break points, etc.

Editor, assembler and monitor—along with sample programs—come on one Radio Shack compatible disk. Extensive documentation included. By Andy Phelps. **$99.95**

SDS-80C: SOFTWARE DEVELOPMENT SYSTEM—Our famous editor, assembler and monitor in Rompack. Like MACRO-80C, it allows the user to write, assemble and debug assembly language programs with no reloading, object patching or other hassles. Supports full 6809 instruction set. Complete manual included. **$89.95**

MICROTEXT: COMMUNICATIONS VIA YOUR MODEM! Now you **can** use your printer with your modem! Your computer can be an intelligent printing terminal. Talk to timeshare services or to other personal computers; print simultaneously through a second printer port; and re-display text stored in memory. Download text to Basic programs; dump to a cassette tape, or printer, or both. Microtext can be used with any printer or no printer at all. It features user-configurable duplex/parity for special applications, and can send any ASCII character. You'll find many uses for this general purpose module! ROMPACK includes additional serial port for printer. **$59.95**

MICRO WORKS COLOR FORTH

- Faster to program in than Basic
- Easier to learn than Assembly Language
- Executes in less time than Basic

The MICRO WORKS COLOR FORTH is a Rompack containing everything you need to run Forth on your Color Computer. COLOR FORTH consists of the standard Forth Interest Group (FIG) implementation of the language plus most of FORTH-79. It has a super screen editor with split screen display. Mass storage is on cassette. COLOR FORTH also contains a decompiler and other aids for learning the inner workings of this fascinating language. It will run on 4K, 16K, and 32K computers. And COLOR FORTH contains 10K of ROM, leaving **your** RAM for **your** programs! There are simple words to effectively use the Hi-Res Color Computer graphics, joysticks, and sound.

Includes a 112-page manual with a glossary of the system-specific words, a full standard FIG glossary and complete source listing.

MICRO WORKS COLOR FORTH . . . THE BEST! From the leader in FORTH, Talbot Microsystems. **$109.95**

MACHINE LANGUAGE

MONITOR TAPE: A cassette tape which allows you to directly access memory, I/O and registers with a formatted hex display. Great for machine language programming, debugging and learning. It can also send/receive RS232 at up to 9600 baud, including host system download/upload. 19 commands in all. Relocatable and reentrant. **CBUG TAPE: $29.95**

MONITOR ROM: The same program as above, supplied in 2716 EPROM. This allows you to use the entire RAM space. And you don't need to reload the monitor each time you use it. The EPROM plugs into the Extended Basic ROM Socket or the Romless Pack I. **CBUG ROM: $39.95**

SOURCE GENERATOR: This package is a disassembler which runs on the Color Computer and generates your own source listing of the BASIC interpreter ROM. Also included is a documentation package which gives useful ROM entry points, complete memory map, I/O hardware details and more. A 16K system is required for the use of this cassette. **80C Disassembler: $49.95**

HARDWARE

PARALLEL PRINTER INTERFACE—Serial to parallel converter allows use of all standard parallel printers. PI80C plugs into the serial output port, leaving your Rompack slot free. You supply the printer cable. **PI80C: $59.95**

SUPER-PRO KEYBOARD—$69.95 (For computers manufactured after Oct. 1982, add $4.95)

ROMLESS PACKS for your custom EPROMS — call or write for information.

BOOKS

6809 ASSEMBLY LANGUAGE PROGRAMMING, by Lance Leventhal, **$18.95**

TRS-80 COLOR COMPUTER GRAPHICS, by Don Inman, **$14.95**

ASSEMBLY LANGUAGE GRAPHICS FOR THE TRS-80 COLOR COMPUTER, by Don Inman, **$14.95**

STARTING FORTH, by L. Brodie, **$17.95**

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ADVENTURE—*Black Sanctum* and *Calixto Island* by Mark Data Products. Each cassette requires 16K. **$19.95** each.

CAVE HUNTER—Experience vivid colors, bizarre sounds and eerie creatures as you wind your way through a cave maze in search of gold treasures. This exciting Hi-Res game by Mark Data Products requires 16K for cassette version. **$24.95**

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The CoCo School Marm

Part 1

By Judy M. Dacus
and
David M. Dacus

The need for the series of programs we describe here and next month occurred to us when our youngest daughter was having difficulty with spelling in grade school and wanted something to help her study. We had a series of spelling practice programs from such sources as Chromasette and other software sources, but these programs all took the "multiple guess" approach to practice — "One of the above words is spelled incorrectly. Can you guess which one and spell it correctly?" That technique provides some practice in spelling, but is nothing like the way spelling tests are presented in school. It seemed that there were few ways to present words to the child without cueing as to the spelling. It then occurred to us that the best way of presentation of the spelling words is the one that has been used in the schools for well over a hundred years — pronounce the word, use it in a sentence, and pronounce the word again.

Since speech synthesis is expensive and somewhat difficult to use, we concentrated on an accessory we already had for the CoCo, the tape recorder. These pro-

(Judy Dacus has a Ph.D. in curriculum and instruction and her specialties are curriculum development and science education. She is currently math, science, and computer science instructor for Mesilla Valley Christian Schools. Mike Dacus is an operations research analyst for The U.S. Army Training And Doctrine Command Systems Analysis Activity (TRASANA) at White Sands Missile Range, N.M. Both have a strong interest in computers in education.)

RAINBOWfest℠

Princeton

Sept. 28-30

Show Schedule:

Friday evening — Exhibit Hall open from 7 p.m. to 10 p.m.

Saturday — Breakfast at 8 a.m. Exhibit Hall opens at 10 a.m. and closes at 6 p.m.

Sunday — Exhibit Hall open from 11 a.m. to 4 p.m.

The fun and excitement of **RAINBOWfest** is coming your way . . . and now there will be a **RAINBOWfest** near you!

For the 1984-85 season, we've scheduled three **RAINBOWfests** in three parts of the country. Each one will offer fun, excitement, new products, seminars and information for your CoCo! And for those who (perish the thought) don't like CoCo as much as you, we've scheduled each **RAINBOWfest** in an area that will provide fun and enjoyment for the whole family.

Our Princeton, New Jersey, show is being held at the Hyatt Regency Princeton, which offers special rates for **RAINBOWfest**. The show opens Friday evening with a 7 p.m. to 10 p.m. session. It's a daytime-only show Saturday — the CoCo Community Breakfast is at 8 a.m., then the exhibit hall opens promptly at 10 a.m. and runs continuously until 6 p.m. There will be no exhibition hours or seminars Saturday evening. On Sunday, the exhibit hall opens at 11 a.m. and closes at 4 p.m.

Our highly popular CoCo Community Breakfast will again feature a well-known figure from the Color Computer Community. And the exhibition will be interspaced with a number of seminar sessions on all aspects of CoCo — from writing in machine language to making your BASIC work better.

But most of all, there will be exhibitors. Lots of them. All ready to demonstrate products of every kind. Some with special programs and hardware items to introduce. Others with show specials.

Tickets can be secured directly from THE RAINBOW. We'll also send you a special reservation form so you can get your special room rate.

Come to **RAINBOWfest** . . . help us all celebrate CoCo Community at its finest.

United Airlines and THE RAINBOW have joined together to offer a special discounted fare to those attending **RAINBOWfest**-Princeton. Simply by calling United at the toll free number listed below and identifying our meeting, with account number 481-I, you will be eligible for a 20 percent discount on the Easy Saver Fare. The only requirement is a Saturday night stay.

(800) 521-4041
Account Number 481-I

RAINBOWfest-Princeton, New Jersey
Date: September 28-30, 1984
Hotel: Hyatt Regency Princeton
Rooms: $64 per night, single or double (Special Rate Deadline, September 7)
Advance Ticket Deadline: September 21, 1984

RAINBOWfest-Irvine, California (L.A. area)
Date: February 15-17, 1985
Hotel: The Marriott Inn
Rooms: Price To Be Announced
Advance Ticket Deadline: February 8, 1985

RAINBOWfest-Chicago, Illinois
Date: May 17-19, 1985
Hotel: Hyatt Regency Woodfield
Rooms: $49 per night, single or double
Advance Ticket Deadline: May 10, 1985

RAINBOWfest
Princeton

Seminar Program And Speakers

- **Frank Hogg** — **Advanced Operating Systems**
  Frank is the president of Frank Hogg Laboratory and a forerunner in FLEX and OS-9 systems.
- **Jim Reed** — **Writing For RAINBOW**
  Jim, managing editor of THE RAINBOW, will talk about how you can submit programs and articles to magazines for fun and profit. He is also senior editor of PCM — and editorial director of SOFT SECTOR (for the Sanyo).
- **Dale Puckett** — **Beginner's Tour Of OS-9**
Beginner's Tour of BASIC09
  A free-lance writer and programmer, Dale has worked with microprocessors since 1976 and has just completed his first book, *The Official BASIC09 Tour Guide*. Dale will be available to sign copies of his book at RAINBOWfest.
- **Dan Downard** — **Machine Language For The Beginner**
  Dan Downard is the technical editor for THE RAINBOW and an electrical engineer. He has been involved in electronics for 24 years through ham radio (K4KWT). His interest in computers began about five years ago and he has built several 68XX systems.
- **Paul Hoffman** — **Inside CoCo Graphics**
  Paul Hoffman is an independent designer/artist and Color Computer programmer. He is the author of Computerware's *Semi Draw* and a number of X-Pad programs.
- **Peter Stark** — **Advanced Operating Systems II**
  Peter is a professor of electrical and computer engineering technology in the City University of New York and is president of Star-Kits Software Systems Corp.

PLUS . . . Additional seminars are planned as well.

There is no charge for admission to seminars. See registration form for admission prices to exhibit area and breakfast.

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grams use the tape recorder to produce the necessary pronunciation and use of the words in sentences. The sound tape is controlled by the computer so that the tape pauses for student responses after each word. We have used block graphics to increase the ergonomic nature of the screen display. The instructions are presented in small digestible chunks, each delineated by a band of color. This will facilitate understanding, particularly for younger children.

The Spelling Practice System is designed to be used as a stand alone system for practice of the week's spelling words at home. When used in conjunction with the Spelling Test System, which we will present in next month's article, it becomes a comprehensive automated spelling practice and examination system for an elementary or secondary class. The spelling practice system consists of two programs, *Word Load* and *AudioSpell*. *Word Load* does double duty in that it produces data tapes that are interchangeable between the practice and testing programs. *AudioSpell* is the program that leads the child through spelling practice sessions step by step.

The Audio Spelling System is designed to operate on the 16K Extended Color BASIC Radio Shack Color Computer with nothing more than a tape recorder and color television. Routines are provided for the use of a line printer if it is available. Modifications for non-Extended BASIC are given later in this article.

AudioSpell

a) Materials

Program Tape or Disk — Program Name *"AUDIOSPL"*

Spelling Words Tape (to be made using *Word Load* program)

Color Computer, Television, and Tape Recorder

Line Printer or student-provided pencil and paper.

b) Instructions

AudioSpell is self instructing. The student should be familiar with the operation of the Color Computer, and with loading programs from cassette tape. Alternatively, the program can be loaded and run, and the *Spelling Words* tape inserted in the recorder before the student is given control of the computer. If your television has an earphone jack you may wish to provide a set of earphones so that the sound of the spelling words does not disturb other learning activities in the class. Do not attempt to plug earphones into the earphone jack of the tape recorder. The program will not function properly if all connections to the computer are not intact. Be sure that the volume of the sound on the television is adjusted to a comfortable level for the student. If you have a line printer, be sure that it is properly attached and turned on. The program will provide a list of words missed for further study. If you do not have a printer, the student will need a pencil and paper to copy the list of misspelled words for further study.

Word Load

a) Materials

Program Tape or Disk — Program Name "WORDLOAD"

Blank Cassette Tape, labeled "Spelling Words"

Color Computer, Television, and Tape Recorder

b) Instructions

The *Word Load* program is self instructing. You should have prepared a list of spelling words and a short sentence using each word before operating the program. *Word Load* allows five seconds to pronounce each word, use it in a sentence, and pronounce it again. After using the program, if you find that five seconds is too long or too short, you may modify the available time according to the modification instructions below. To preclude inadvertent erasure of the spelling words tape, you should break out the record-enable tab on the back of the tape after you have completed recording. The tape may be reused for the following week's words, if desired, by placing a piece of tape over the tab hole while recording. In order to prevent words from a longer list from spilling over into a shorter list, the previous spelling word list should be erased before recording a new list. Spelling words can be recorded for several levels of learning by using a separate cassette tape for each word list.

Modifications

Recording Time. Five seconds recording time was selected as optimum for the average user. To change recording time, it is necessary to change only one value in each of the programs. The Color Computer requires one second to count to 460 in a *FOR - NEXT* loop, such as the one found in Line 280 of the *Word Load* program. To change the length of time allowed to pronounce the word and use it in a sentence, you must multiply the number of seconds desired times 460 and place the resulting value in Line 280 of the *Word Load* program, and Line 290 of the *AudioSpell* program in place of the value 2300. Both programs must contain the same value in the timing loop for the tapes to be read correctly.

Praise Statements. The reinforcement expressions for correct answers in the *AudioSpell* program are located in Lines 610 to 700. If you wish to replace one of the praise statements with a statement of your own, you may do so by replacing the expression enclosed in quotation marks with your own expression. If you want to add more praise statements, you must modify Lines 580 and 590. To add more expressions, add lines after Line 700 using the same *PRINT " ":RETURN* format found in the original print statements. You must then increase the value 10 in the expression *B = RND(10)* in Line 580 by the number of lines you added, and add a comma and the line number of each line you added after number 700 in Line 590.

Using Programs With No Printer Available. If you do not have access to a printer, you may want to eliminate the student input regarding the printer. If you have a printer and always intend to have misspelled words printed rather than displayed on the TV screen, you may wish to eliminate the choice of TV display. To eliminate choice of the printer, change the expression "Do you have a printer (yes or no)" in Line 450 of *AudioSpell* to "Press ENTER to continue," and eliminate everything after the variable A$ in Line 450. Next, eliminate program Lines 520 through 560. To eliminate the choice of printing the list to the TV, modify Line 450 exactly as above, and eliminate program Lines 460 through 510.

Changing Printer Codes. The printing algorithms of these programs are written using ASCII codes for an Epson MX-80 printer. This printer uses *CHR$(14)* to print double-width characters and *CHR$(10)* as a line feed command. If your printer does not use these two codes you must substitute your printer code for *CHR$(14)* in Line 530 of *AudioSpell*, and substitute your printer's equivalent of *CHR$(10)* in Lines 530, 540, 550, and 560 of *AudioSpell*.

Modification To Run On A Non-Extended CoCo. As the programs are listed, they are for use on an Extended Color BASIC machine. To use these programs on a level 1 machine requires only removal or replacement of two reserved Extended words. The screens are formatted with the reserved word *STRING$*. This command prints a string of N copies of the ASCII character X as in *PRINT @ 0, STRING$*

(N,X). To substitute for the *STRING$* command using level I BASIC, you can substitute the algorithm:

> 15 FOR I = 1 TO 32, : SC$ = SC$ + CHR$(169): NEXT I

You will need one line and one variable for each different color band you wish to print. After you have inserted the variable at the front of the program, you may then substitute the command, *PRINT SC$* in place of each *PRINT STRING$* command in the program. The other Extended BASIC command, *B - RND(-TIMER)*, occurs in Line 580 of *AudioSpell*. The purpose of this command is to randomize the selection of random numbers. This command can be deleted and the only result will be that the praise statements will be printed in the same pattern every time the machine is turned on.

THE ASCII SYMBOL. In Line 110 of *AudioSpell*, the listing shows an underscore character in parentheses in the instructions to be printed to the screen. This is shown as a back arrow on the computer screen, and is made by entering a shifted up arrow on the keyboard.

Coming Attractions

Next month we will present the programs designed to allow the student to be examined in precisely the same manner as he or she prepared for the test. For those who have disk systems, we have developed a version of all programs modified for the Disk Extended Color Computer. Using the system on disk will allow automated recording of grades in a grade file without teacher intervention. It will also expedite and facilitate student use of the spelling programs. The complete set of four programs for the disk version is available on cassette tape for $10. Our address is 206 Capri Road, Las Cruces, NM 88005. If you have problems with your entered version of these programs, be sure you have thoroughly proofread your code before writing or calling. Please send a self-addressed stamped envelope with your request for help or you can call us at (505) 524-3389. Please call between 5 and 10 p.m. Mountain Time.

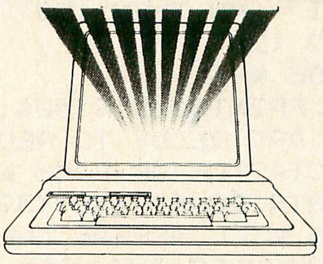
Listing 1:

110	129
180	151
350	67
450	159
540	168
660	102
END	188

```
10 ' SPELLING DRILL AND PRACTICE
20 'COPYRIGHT 1982 BY JUDY M. AN
D DAVID M. DACUS, 206 CAPRI, LAS
 CRUCES, NM 88001
30 CLEAR 2000:NW = 50:DIM WRD$(N
W)
40 CLS:PRINT@0,STRING$(32,169);:
PRINT@42,"AUDIO SPELL"
50 PRINT@64,STRING$(32,169);"HI!
  MY NAME IS COCO THE COLOR  COM
PUTER.  CALL ME COCO.  THAT'SWHA
T ALL MY FRIENDS CALL ME."
60 PRINT@192,STRING$(32,169);:IN
PUT "WHAT IS YOUR NAME";NAM$
70 PRINT@256,STRING$(32,169);"TH
AT'S A NICE NAME - "NAM$".":PRIN
T@320,STRING$(32,169);
80 PRINT@352,"DO YOU KNOW HOW I
WORK? (TYPE NOAND I WILL TELL YO
U WHAT TO DO) PLEASE TYPE YES OR
 NO AND       PUSH <ENTER>"
90 INPUT A$:IF LEFT$(A$,1) = "Y"
 THEN 140
100 CLS:PRINT@0,STRING$(32,169);
"I WILL SAY THE WORD, I WILL USE
 THE WORD IN A SENTENCE, AND THE
NSAY THE WORD AGAIN.  WHEN I
 FINISH THE WORD I WILL ASK YOU
 TO SPELL IT.":PRINT@192,STRING$
(32,169);
110 PRINT"IF YOU MAKE A MISTAKE
USE THE    BACK ARROW (_) TO ERAS
E.":PRINT@288,STRING$(32,169);:I
NPUT"PUSH <ENTER> TO CONTINUE";A
$
120 CLS:PRINT@0,STRING$(32,169);
"WHEN YOU THINK YOU HAVE SPELLED
 THE WORD CORRECTLY,PRESS <ENTER
>.  I WILL TELL YOU IF YOU HAVE
 SPELLED THE WORD CORRECTLY.  IF
 YOU DIDN'T, YOU  WILL HAVE
 ANOTHER CHANCE TO SPELL THE WOR
D.":PRINT@256,STRING$(32,169)
130 INPUT"PUSH <ENTER> TO CONTIN
UE";A$
140 CLS:PRINT@0,STRING$(32,169);
"NOW WE ARE READY TO START
 SPELLING THIS WEEK'S WORDS."
150 PRINT@96,STRING$(32,169);"PL
EASE CHECK TO SEE THAT THE    TA
PE MARKED - SPELLING WORDS -  IS
 IN THE TAPE RECORDER, THE    TA
PE IS REWOUND, AND THE        RE
CORDER IS ON PLAY."
160 PRINT@288,STRING$(32,169);
170 INPUT"WHEN YOU HAVE CHECKED
ALL THIS, PUSH MY <ENTER> BUTTON
 AND I'LL MOVE THE TAPE TO GET R
EADY.";A$:CLS:PRINT@328,"OOH!  T
HAT TICKLES!!":PRINTSTRING$(32,1
69);"I AM LOADING THE WORDS FROM
 TAPE"
180 I = 0:W = 0:W1 = 0:W2 = 0:W$
 = "":W1$ = "":W2$ = ""
190 OPEN"I", #-1,"WORDS"
200 IF EOF (-1) THEN 250
210 I = I + 1
220 INPUT #-1, W$
230 WRD$(I) = W$
240 GOTO 200
```

```
250 CLOSE #-1
260 NW = I
270 CLS:PRINT@0,STRING$(32,169);
:INPUT"WHEN YOU ARE READY FOR YO
UR      FIRST WORD PUSH MY <ENTER
>       BUTTON.";A$:CLS:PRINT@0,S
TRING$(224,169);"          LISTEN
CAREFULLY."
280 FOR I = 1 TO NW
290 AUDIO ON:MOTORON:FOR V = 1 T
O 2300:NEXT V:AUDIO OFF:MOTOROFF
300 SKIPF "MARKER":CLS:PRINT@0,S
TRING$(224,169);
310 INPUT"PLEASE SPELL THE WORD
YOU JUST  HEARD.";ANS$
320 IF ANS$ = WRD$(I) THEN R = R
 + 1:GOTO 580 ELSE W = W + 1:W$(
W) = WRD$(I)
330 CLS:PRINT@0,STRING$(224,246)
;:INPUT"I'M SORRY THAT IS NOT CO
RRECT.  PLEASE TRY AGAIN.";ANS$
340 IF ANS$ = WRD$(I) THEN 580 E
LSE W1 = W1 + 1:W1$(W1) = WRD$(I
)
350 CLS:PRINT@0,STRING$(224,246)
;"THE CORRECT SPELLING IS:",WRD$
(I)
360 PRINT@320,STRING$(32,169);:I
NPUT"PLEASE TRY AGAIN TO SPELL I
T  ";ANS$
370 IF ANS$ = WRD$(I) THEN 580 E
LSE W2 = W2 + 1:W2$(W2) = WRD$(I
)
380 CLS:PRINT@0,STRING$(224,246)
;"YOU MISSED THE WORD WITH IT
  WRITTEN ON THE SCREEN IN FRONT
  OF YOU.  PLEASE BE MORE CAREFU
L."
390 INPUT"READY FOR THE NEXT WOR
D";A$:CLS:PRINT@0,STRING$(224,16
9);"        LISTEN CAREFULLY"
400 NEXT I
410 CLS:AUDIO OFF:PRINT@0,STRING
$(32,175);"YOU ATTEMPTED TO SPEL
L              ";NW;" WORDS.":G = (R
/(W+R))*100
420 PRINT"YOU MISSPELLED ";W;" W
ORDS OUT OF ";W+R;" ATTEMPTS FOR
 A SCORE OF    ";G;"%."
430 IF W1 > 0 THEN PRINT"YOU ALS
O MISSPELLED";W1;"WORDS AT  LEAS
T TWICE";:IF W2 > 0 THEN PRINT",
 AND";W2;"WORDS THREE  TIMES." E
LSE PRINT "."
440 IF W = 0 THEN PRINT@ 192,STR
ING$(32,175);"WOW, YOU DID A TER
RIFIC JOB.    PRESS <ENTER> TO C
ONTINUE.":INPUT A$:GOTO 560
450 PRINT@288,STRING$(32,175);:I
NPUT"DO YOU HAVE A PRINTER(YES O
R NO)";A$:IF LEFT$(A$,1) = "Y" T
HEN 520
460 CLS:PRINT "THESE ARE THE WOR
DS MISSED AT   LEAST ONCE":FOR I
 = 1 TO W
470 PRINT W$(I),:NEXT I:PRINT:IN
PUT "WHEN YOU HAVE COPIED THESE
WORDSON A PIECE OF PAPER PUSH <E
NTER>";A$:CLS
480 IF W1 > 0 THEN PRINT"THESE A
RE THE WORDS MISSED AT   LEAST T
WICE":FOR I = 1 TO W1 ELSE GOTO
570
490 PRINT W1$(I),:NEXT I:PRINT:I
NPUT "PUT A CHECK MARK BY THESE
WORDS ON THE LIST YOU JUST MADE
THEN  PUSH ENTER";A$:CLS
500 IF W2 > 0 THEN PRINT "THESE
ARE THE WORDS MISSED THREE TIMES
":FOR I = 1 TO W2 ELSE GOTO 570
510 PRINT W2$(I),:NEXT I:PRINT:I
NPUT "YOU MISSPELLED THESE WORDS
 EVEN AFTER THEY WERE PRINTED ON
 THE  SCREEN.  PUSH <ENTER> TO
      CONTINUE.";A$:GOTO 570
520 CLS:PRINT@0,STRING$(224,175)
;"PRINTING ALL MISSPELLED WORDS"
530 PRINT#-2,CHR$(14);"SPELLING
STUDY LIST FOR ";NAM$;CHR$(10);C
HR$(10)
540 PRINT#-2,"LIST OF WORDS MISS
PELLED AT LEAST ONE TIME";CHR$(1
0);CHR$(10):FOR I = 1 TO W:PRINT
#-2, W$(I):NEXT I
550 IF W1 > 0 THEN PRINT#-2,CHR$
(10);CHR$(10);"LIST OF WORDS MIS
SED AT LEAST TWO TIMES";CHR$(10)
;CHR$(10):FOR I = 1 TO W1:PRINT#
-2, W1$(I):NEXT I
560 IF W2 > 0 THEN PRINT#-2,CHR$
(10);CHR$(10);"LIST OF WORDS MIS
SED THREE TIMES":FOR I = 1 TO W2
:PRINT#-2, W2$(I):NEXT I
570 CLS:PRINT@0,STRING$(224,169)
;"THANK YOU FOR PRACTICING YOUR
  SPELLING WORDS WITH ME.  LET'S
  WORK TOGETHER AGAIN SOON.":END
580 B = RND(-TIMER):B = RND(10):
CLS:PRINT@0,STRING$(224,175);
590 ON B GOSUB 610,620,630,640,6
50,660,670,680,690,700:PRINT@288
,STRING$(32,175);
600 GOTO 390
610 PRINT"YOU'RE A REGULAR SPELL
ING WHIZ! CONGRATULATIONS!":RETU
RN
620 PRINT"WOW!  THAT WAS GOOD.":
RETURN
```

SUPER SCREEN



- A big 51 character by 24 line screen.
- Full upper and lower case characters.
- Easily combine text with hi-res graphics.
- PRINT @ is completely functional on the big screen.
- The powerful ON ERROR GOTO is fully implemented.
- Auto-key repeat for greater keyboard convenience.
- Control codes for additional functions.
- Works with 16K, 32K or 64K computers.
- Available on disc or cassette.
- Works with extended and/or disc BASIC.

51 CHARACTERS BY 24 LINE DISPLAY

Super Screen is a powerful, machine language program that significantly upgrades the performance and usefulness of 16K or greater, Extended and Disc Basic Color Computers. The standard Color Computer display screen is totally inadequate for serious, personal or business applications so Super Screen replaces it with a brand new, 51 character wide by 24 line screen including full upper and lower case characters. Instead of a confusing checkerboard appearance, you now have true lower case letters along with a screen that is capable of displaying 1224 characters. The difference is startling! Your computer takes on new dimensions and can easily handle lines of text that were simply too long and complex to display on the old screen.

COMBINE TEXT WITH HI-RES GRAPHICS

You can now write truly professional looking programs that combine text with hi-res graphics. Super Screen allows you to create graphics displays with the Basic LINE, DRAW and CIRCLE statements and then notate the graphics with descriptive text. You can even use PRINT @ if you wish for greater programming convenience. Super Screen's versatility will amaze you.

PRINT @ IS FULLY IMPLEMENTED

The PRINT @ statement is a valuable asset to the programmer when formatting text on the screen. The standard Color Computer will report an error if you specify a location higher than 511 but Super Screen allows locations all the way to 1223! You get a big screen and a powerful formatting tool as well. Of course, Super Screen also supports the CLS command allowing you to clear the big screen using standard Basic syntax.

ON ERROR GOTO

That's right! Super Screen gives you a full implementation of ON ERROR GOTO including the ERR and ERL functions. Now you can trap errors and take corrective action to prevent crashed programs and lost data using the same standard syntax as other computers. The ON ERROR GOTO capability overcomes a serious deficiency of Color Computer Basic and greatly improves your capability to handle sophisticated tasks. All well written, 'user friendly' programs use error trapping techniques and yours can too! Now that's power!

AUTO KEY REPEAT

No more frustration as you edit a long line in your Basic program; just hold the space bar down and automatically step to the desired position in the line. Need a line of asterisks? Hold the key down and auto repeat will give them to you. Those of you who spend many hours at your keyboard will appreciate this outstanding addition to Super Screen's long list of impressive capabilities.

CONTROL CODES FOR ADDITIONAL FUNCTIONS

Super Screen recognizes several special control code characters that allow selection of block or underline, solid or blinking cursor and other functions. You can 'Home Up' the cursor or you may erase from the cursor to the end of a line or to the end of the screen just like many other computers. These special codes give you an extra dimension of versatility and convenience that put Super Screen in a class by itself.

AND MORE GOOD NEWS...

Super Screen comes with complete, well detailed instructions and is available on cassette or disc. It adjusts automatically to any 16K or greater, Extended or Disc Basic Color Computer or TDP-100 and uses only 2K of memory in addition to the screen memory reserved during power up. Guaranteed to be the most frequently used program in your software library...once you use it, you won't be without it! Super Screen's low price will really please you; only $29.95 on cassette or $32.95 on disc!

64K Memory Expansion Kit

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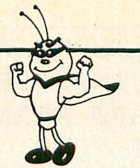
NEW! SUPER BUG



Mark Data Products SUPER BUG is a powerful, relocatable machine code monitor program for your Coco. If you are a beginner, the program and documentation are an indispensable training aid, helping you to gain a better understanding of your Color Computer and machine code programming. If you are an accomplished computerist, SUPER BUG's capabilities, versatility and convenience will prove invaluable during programming and debugging.

SUPER BUG offers so many outstanding features that we are unable to list them all in this limited space. hex and alpha numeric memory display, modify, search and test; full printer support with baud rate and line feed select; up to 220 breakpoints; mini object code disassembler; 64K mode setup; decimal, hex and ascii code conversion routines and extensive documentation. Only $29.95 on cassette or $32.95 on disc.

ORDER ENTRY SYSTEM

The Mark Data Products sales order processing system will give a fast, efficient means to enter orders, print shipping papers and invoices, prepare sales reprots, and monitor receivables. The system automatically enhances the monitor screen to a 51 character by 24 line display. 32K of memory is required along with an 80-column printer, and one or more disc drives.

The MDP order entry system is a family of programs which operate interactively by means of a "menu" selection scheme. Up to 900 products may be defined and a single disc system can hold over 600 transactions. When the operator selects a task to be performed, the computer loads a program designed to handle that task from the system disc. The system disc contains all of the programs required to create, update and maintain data files and prepare the necessary paperwork including shipping and invoice forms, daily sales reports, a monthly (or other period) sales report and a receivables report.

The MDP system:

- Is accurate, user friendly and simple to use.
- Is easy to customize for specific user requirements.
- Produces a traceable invoice.
- Handles receivables as well as closed orders.
- In capable of future expandability.

This accounting software equals or exceeds higher priced packages for other computers and includes a detailed operating manual. For just $99.95.

ACCOUNTING SYSTEM

The Mark Data Products accounting system is ideal for the small businessman needing a fast, efficient means to process income and expenses, prepare detailed reports and maintain most of the information required at tax time. The system is a family of programs which operate by means of a "menu" selection scheme. When the operator selects a task to perform, the computer loads a program designed to handle that task from the system disc. The system disc contains all of the programs required to create, update and maintain data files and prepare the necessary accounting reports including a transaction journal, a P&L or income report, an interim or trial balance and a balance sheet.

Up to 255 separate accounts may be defined and a single disc system can hold over 1,400 transactions. This system automatically enhances the monitor screen to a 51 character by 24 line display. 32K of memory is required along with an 80-column printer and one or more disc drives.

The MDP system:

- Is accurate, user friendly and simple to use.
- Is easy to customize for specific user requirements.
- Immediately updates the chart of accounts.
- Provides an audit trail.
- Includes end of period procedures.
- Is capable of future expandability.

This order entry software equals or exceeds higher priced packages for other computers and includes a detailed operating manual. For just $99.95.

IMPORTANT NEW BOOKS

"Your Color Computer" by Doug Mosher. Over 300 pages of detailed information—A CoCo encyclopedia. $16.95

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```
630 PRINT"TERRIFIC! KEEP ON SPEL
LING.":RETURN
640 PRINT"OUTSTANDING!!  I'LL BE
T YOUR     MAMA WAS A DICTIONARY.
":RETURN
650 PRINT"WONDERFUL!  KEEP GOING
.":RETURN
660 PRINT"GREAT SPELLING!  WISH
I WERE     THAT GOOD.":RETURN
670 PRINT"GOOD JOB!  YOU'RE DOIN
G IT NOW.":RETURN
680 PRINT"SUPER! YOU'RE A GOOD S
PELLER.":RETURN
690 PRINT"THAT'S GREAT!  EVERYON
E WILL BE PROUD OF YOU.":RETURN
700 PRINT"BEAUTIFUL!  KEEP UP TH
E GOOD     WORK.":RETURN
```

```
90 ......... 23
240 ....... 254
END ....... 58
```

Listing 2:

```
10 REM WORD LOADING PROGRAM
20 'COPYRIGHT 1982 BY JUDY M. AN
D DAVID M. DACUS, 206 CAPRI, LAS
 CRUCES, NM 88001
30 CLEAR 2000:Z$ = "MARKER":DIM
WRD$(50)
40 CLS:PRINT@0,STRING$(32,185);"
WE ARE NOW READY TO ENTER THE
SPELLING WORDS."
50 PRINT@96,STRING$(32,185);"FIR
ST, I WILL ASK YOU TO ENTER  THE
 CORRECT SPELLING OF EACH    WOR
D AT THE KEYBOARD.":PRINT@224,ST
RING$(32,185);
60 PRINT"AFTER WE HAVE RECORDED
THE        CORRECT SPELLING OF THE
 WORDS,  WE WILL RECORD YOU PRON
OUNCING  EACH WORD."
70 PRINT@384,STRING$(32,185);:IN
PUT "PRESS <ENTER> TO CONTINUE";
A$
80 CLS:PRINT@0,STRING$(64,185);"
PLACE YOUR TAPE IN THE RECORDER,
REWIND IT, AND push the play and
 record buttons."
90 PRINT@160,STRING$(32,185);:IN
PUT "HOW MANY WORDS ARE TO BE
      RECORDED";NW
100 I = 0:MOTORON:FOR Z = 1 TO 2
300:NEXT Z:MOTOROFF
110 OPEN "O",#-1,"WORDS"
120 I = I + 1
130 CLS:PRINT@128,STRING$(32,185
);:INPUT "PLEASE ENTER THE NEXT
SPELLING  WORD";W$
140 PRINT#-1,W$
150 WRD$(I) = W$
160 IF I = NW THEN 180
170 GOTO 120
180 CLOSE #-1
190 CLS:PRINT@0,STRING$(64,185);
"NOW WE ARE READY TO RECORD YOUR
 PRONUNCIATION OF EACH WORD."
200 PRINT@128,STRING$(32,185);"T
HE WORDS WILL APPEAR ONE AT A  T
IME. PRONOUNCE THE WORD, FOLLOWW
ITH A SHORT SENTENCE USING THE W
ORD, AND PRONOUNCE THE WORD    A
GAIN. YOU WILL HAVE 5 SECONDS  T
O SAY THE WORD AND SENTENCE    B
EFORE THE TONE SOUNDS.
210 PRINT@384,STRING$(32,185);:I
NPUT "PRESS <ENTER> TO CONTINUE"
;A$
220 CLS:PRINT@0,STRING$(64,185);
"YOU WILL HAVE TO UNPLUG AND PLU
GIN THE AUX PLUG FOR EACH WORD,
 BUT YOU WILL BE PROMPTED BY THE
 PROGRAM EACH TIME."
230 PRINT@192,STRING$(32,185);:I
NPUT "IF THE TAPE RECORDER IS ST
ILL ONRECORD AND YOU ARE READY P
RESS  <ENTER>";A$
240 FOR I = 1 TO NW
250 CLS:PRINT@0,STRING$(128,185)
;"*****UNPLUG THE AUX PLUG******
**";
260 PRINT@160,STRING$(32,185);"t
he word is "WRD$(I)
270 PRINT@256,STRING$(32,185);"P
RESS <ENTER> AND START TALKING A
FTER THE FIRST TONE SOUNDS.";:IN
PUT A$
280 MOTORON:SOUND 40,5:FOR V = 1
 TO 2300:NEXT V:MOTOROFF:SOUND 4
0,5
290 CLS:PRINT@0,STRING$(128,185)
;"******PLUG IN THE AUX PLUG****
**"
300 PRINT@192,STRING$(32,185);"P
RESS <ENTER> WHEN READY";:INPUT
A$
310 CLS:PRINT@192,"ADDING A SYNC
 MARKER"
320 OPEN "O", #-1, "MARKER":PRIN
T#-1, Z$:CLOSE #-1
330 NEXT I
340 CLS:PRINT@0,STRING$(224,169)
;"THE TAPE IS NOW COMPLETE.  IT
  MAY NOW BE REWOUND AND USED
  WITH EITHER THE AUDIO SPELLING
  PRACTICE OR SPELLING TEST
  PROGRAMS."
```

T.A.G.

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DEVIL ASSAULT *(Tom Mix)*

1,762,980	★Michael Rosenberg, Prestonsburg, KY
1,294,300	John Statham, Strathroy, Ontario
625,000	Simon Dickson, Bangor, N. Ireland
318,550	Kanti Dinda, Kingston, Ontario
294,300	Chip Lilley, Finleyville, PA
78,500	Stephane Asselin, Hauterive, Quebec

DOODLE BUG *(Computerware)*

3,149,330	★Eiko Cary, National City, CA
2,577,515	Tim Brown, Clio, MI
1,767,630	Perry Denton, New Baden, IL
448,890	Ellen Ballinger, Uxbridge, Ontario
109,660	Byron Albertson, Williams Lake, British Columbia

DOUBLE BACK *(Radio Shack)*

1,125,000	★Mark Hurst, Sheridan, OR
1,080,000	Phillipe Duplanties, St. Jerome, Quebec
639,210	Paul Baker, Pittsburgh, PA
605,890	Peter Sherburne, Highland, CA
474,040	Paul Moritz, Butte, MT
304,910	Alfredo Santos, New York, NY
142,150	Pamela Santos, New York, NY
64,170	Curtis Frazier, Jr., Enterprise, AL

DRACONIAN *(Tom Mix)*

86,600	★James Toth, Punxsutawney, PA
71,930	●Michael Corman, W. Lafayette, IN
47,670	Dan Neuman, Wauwatosa, WI

DUNKEY MUNKEY *(Intellectronics)*

1,244,400	★Jack Baran, Bensalem, PA
1,015,000	●Kyle Keller, Overland Park, KS

ELECTRON *(Tom Mix)*

45,510	★John Sandberg, Concord, CA
41,750	Michael Rosenberg, Prestonsburg, KY
22,990	Alan Morris, Chicopee, MA
19,500	Robby Presson, Florissant, MO
11,020	Alfredo Santos, New York, NY

FIRE COPTER *(Adventure International)*

97,390	★Sam Hughes, Colton, CA
78,860	Woody Farmer, Acme, Alberta
53,280	Kevin Marsh, Bokeelia, FL

FLYBY *(Chromasette)*

104,980	★David Finberg, Annandale, VA
28,910	Ron Suedersky, Universal City, TX
20,110	Rick Mansell, Calgary, Alberta
16,670	Michael Rhattigan, Cory, NC
4,880	Shen Mansell, Calgary, Alberta

FOOTBALL *(Radio Shack)*

256-0	★Mike Garozzo, Morrisville, PA
217-0	●Glen Giacomelli, Woodbridge, Ontario
161-0	David Hart, Salt Lake City, UT

FROGGIE *(Spectral Associates)*

86,010	★David Garozzo, Morrisville, PA
84,440	●Bill Ide, Newark, DE
74,050	Mike Garozzo, Morrisville, PA

FURY *(Computer Shack)*

78,200	★Jon Jenkins, Milner, GA

GALAGON *(Spectral Associates)*

647,230	★Jack A. Tindle, Soquel, CA
386,950	Robert Ahlgrim, Hutchinson, KS
286,741	●Rod Moore, Fork Union, VA
188,130	Daryl Judd, Nampa, ID
183,180	Lori Heape, Hutchinson, KS
136,510	Mike Ashworth, Huntington, WV

GALACTIC ATTACK *(Radio Shack)*

48,520	★Paul Sanecki

GALAX ATTAX *(Spectral Associates)*

253,900	★Shawn McAlpin, Louisville, KY
113,650	Darrin Filand, WA
104,550	Mitch Hayden, Univ. of Minn.
82,650	Steve Hargis, Tucson, AZ
74,550	John Gosselin, Campbell River, British Columbia
23,500	Kevin Marsh, Bokeelia, FL

GHOST GOBBLER *(Spectral Associates)*

1,007,430	★Todd Brannam, Charleston Hts., SC
825,250	Randy Gerber, Wilmette, IL
423,390	Rich McGervey, Morgantown, WV
255,000	John Osborne, Kincardine, Ontario
228,290	Patricia Lau, York, PA
120,400	David Iverson, Dorval, Quebec
69,900	Jeff Andreessen, New Lisbon, WI

GLAXXONS *(Mark Data)*

18,984	★Luc Poliquin, Montreal, Quebec

GLOMMER *(THE RAINBOW)*

154	★Susan Ballinger, Uxbridge, Ontario

GRABBER *(Tom Mix)*

129,100	★Blossom Mayor, E. Greenbush, NY
70,600	Michael Corman, Lafayette, IN
27,750	Ellen Ballinger, Uxbridge, Ontario
10,050	Anthony Schmuck, Wellsville, PA

GREY LADY *(Jarb Software)*

58,300	★Bertha Jeffries, San Bernardino, CA

HEIST *(THE RAINBOW)*

1,500	★Andy Dater, Medford, OR
1,500	★Jeff Roberg, Winfield, KS
1,300	Richard King, Houston, TX

JUNIOR'S REVENGE *(Computerware)*

3,007,000	★Tim Brown, Clio, MI

SCOREBOARD

2,154,900	Scott Kubota, Whitby, Ontario
2,099,300	Shawn McAlpin, Louisville, KY
1,220,000	Edwin Prather, Oxnard, CA
1,115,300	Ryan Van Manen, Grand Rapids, MI
KATERPILLAR ATTACK *(Tom Mix)*	
31,672	★Scott Fairfield, Williamstown, MA
25,949	James A. Lafare, Williamstown, MA
18,949	Vadim Gotovsky, Toronto, Ontario
15,821	Alex Gotovsky, Toronto, Ontario
5,426	Russ Rosen, Cardiff, CA
KEYS OF THE WIZARD *(Spectral Associates)*	
662	★Susan Ballinger, Uxbridge, Ontario
662	★Pegi Tindle, Soquel, CA
662	★Ellen Ballinger, Uxbridge, Ontario
KING TUT *(Tom Mix)*	
130,200	★Alan Higgs, Calgary, Alberta
THE KING *(Tom Mix)*	
10,000,100	★Mark Smith, Santa Ana, CA
4,040,300	Andy Truesdale, Ferguson, MO
3,343,000	Corey Friedman, Minnetonka, MN
2,410,200	Candy Harden, Birmingham, AL
2,367,900	Richard Lacharite, Sherbrooke, Quebec
545,700	Tim Magnusen, Lafayette, TN
148,200	Chris Cope, Central, SC
KLENDATHU *(Radio Shack)*	
1,962,741	★Jay Pribble, Davenport, IA
1,245,821	●John Sandberg, Concord, CA
1,193,350	Tommy Parker, Talladega, AL
1,182,685	David L. Ferris, Shickshinny, PA
LANCER *(Spectral Associates)*	
2,797,450	★Randall Edwards, Dunlap, KS
2,354,000	Alex State, Las Vegas, NV
875,150	Larry Capen, Folsom, CA
736,250	Sharon Casten, Folsom, CA
617,500	Donna Willoughby, Brookfield, IL
124,200	Curtis Frazier, Jr., Enterprise, AL
LASERWORM & FIREFLY (THE RAINBOW)	
94,748	★Brian Chafin, Weyers Cave, VA
54,672	Michael Rosenberg, Prestonsburg, KY
43,420	Eric Morrell, Sayreville, PA
37,250	Rene Belisle, Montreal, Quebec
29,872	Theodore Latham Jr., Rich Square, NC
LUNAR ROVER PATROL *(Spectral Associates)*	
162,100	★Sara Aliff, Northeast, MD
154,650	Tom Aliff Jr., Northeast, MD
66,900	Wayne Johansen, Rocanville, Saskatchewan
66,850	Randall Edwards, Dunlap, KS
47,250	Curtis Frazier, Jr., Enterprise, AL
36,300	Jeff Luster, Fairview Park, OH
MAZELAND *(Chromasette)*	
3,050	★Mark Kromeke, Albuquerque, NM
MAZE PANIC *(New Horizons Group)*	
12,080	★Paul Sanecki
MARATHON (THE RAINBOW)	
109,330	★Jimmy Morse, St. John, WA
101,520	●David Dean, West Mansfield, OH
71,550	Larry Evans, Elk Grove Village, IL
MEGA-BUG *(Radio Shack)*	
60,000	★Robin Worthem, Milwaukee, WI
18,902	John Tiffany, Washington, DC
15,999	Ed Mitchell, Ragged Mountain, CO
14,297	Aleisha Hemphill, Los Angeles, CA
11,894	Paschal Wilson, Kentwood, LA
METEORS *(Spectral Associates)*	
26,580	★Kevin Endlich, Perry Hall, MD
16,870	Keith Marsh, Bokeelia, FL
14,200	Craig Dutton, Goose Bay, Labrador
MONSTER MAZE *(Radio Shack)*	
650,530	★Bruce March, Barrie, Ontario
533,450	John Hankerd, Gaines, MI
495,850	Andrew Mitchell, Melbourne, Australia
300,000	James Stevenson, Marshall, TX
MOON HOPPER *(Computerware)*	
114,540	★Susan Ballinger, Uxbridge, Ontario
53,570	Robert Harmon, Virginia Beach, VA
MISS GOBBLER *(Procolour Group)*	
59,900	★Cathy Anderson, Carnegie, OK
MR DIG *(Computerware)*	
2,301,000	★Jeff Roberg, Winfield, KS
1,976,500	Tim Magnusen, Lafayette, TN
522,150	Dwight Elliott, Pompton Lakes, NJ
486,750	Jason Graff, So. Charleston, WV
470,000	Ryan Sambrook, Miami Lake, FL
412,000	●Tommy Wald, Minneapolis, MN
211,450	Catherine Henry, Boca Raton, FL
MUDPIES *(MichTron)*	
185,200	★Bertha Jeffries, San Bernardino, CA
156,800	●Glenn Wasson, Castleton, NY
147,400	Chris Hafey, Auburn, CA
124,400	Bernd Pruetting, Scheibenhardt, West Germany
79,900	Kevin Marsh, Bokeelia, FL
18,500	Steve Springer, Louisville, KY
NINJA WARRIOR *(Programmer's Guild)*	
151,100	★Douglas Rodger, Harvard, MA
106,300	●Bud Seibel, Tumbler Ridge, British Columbia
102,400	Christopher Gelowitz, Claresholm, Alberta
86,100	Ryan Sambrook, Miami Lake, FL
75,300	Brad Gaucher, Hinton, Alberta
49,000	Susan Ballinger, Uxbridge, Ontario
35,800	Kelly Anderson, Carnegie, OK
17,400	Lisa Ballinger, Uxbridge, Ontario
OFFENDER *(American Business Computers)*	
113,000	★Kevin Marsh, Bokeelia, FL
OUTHOUSE *(MichTron)*	
530,751	★Rosalie Siclari, Staten Island, NY
528,694	●Benjamin Hebb, Bridgewater, Nova Scotia
160,200	David Lazar, Englishtown, NJ
101,650	Davey Devlin, Clyde, NC
69,848	Phillip Laurell, Lansing, MI
6,412	Kevin T. Cornell, Greentown, IN
6,022	Steve Springer, Louisville, KY
PAC 'EM (THE RAINBOW)	
2,080	★Stephanie Gregory, Coco Solo, Panama
1,999	Kevin R. Hubbard, Huntington, WV
1,951	●Dr. James Peterson, Radcliff, KY
1,870	Steve Olson, Calgary, Alberta
1,631	Raymond R. Hubbard, Huntington, WV
1,572	Kenneth Bergenham, Lawton, MI
PARA-JUMPER (THE RAINBOW)	
822	★Peter MacLeod, Montague, Prince Edward Island
PHANTOM SLAYER *(Med Systems Software)*	
2,668	★Michael Brooks, Glade Spring, VA
2,488	Troy Messer, Joplin, MO
1,852	Curtis Boyle, Saskatoon, Saskatchewan
1,306	Marc Hassler, Gainesville, FL
1,126	Gille Giroux, North Bay, Ontario
PICTURE PUZZLE *(DSL Products)*	
30,126	★Vicki Ineson, Westland, MI
PINBALL *(Radio Shack)*	
12,000,000	★Gerry Farmer, Calgary, Alberta
2,800,090	●Glen Ewing, Brooklin, Ontario
PLANET INVASION *(Spectral Associates)*	
177,900	★Russ Rosen, Cardiff, CA
POLARIS *(Radio Shack)*	
231,296	★Nico Swinkels, Boxtel, Netherlands
63,053	●Paschal Wilson, Kentwood, LA
POLTERGEIST *(Radio Shack)*	
6,600	★Ray Suplee
POOYAN *(Datasoft)*	
1,138,500	★Linda Cote, Montreal, Quebec
890,850	●Jerry Morgan, Independence, MO
480,450	Bernd Pruetting, Scheibenhardt, West Germany
279,450	Chip Lilley, Finleyville, PA
273,450	Davey Devlin, Clyde, NC
249,900	Erika Oldale, Athabasca, Alberta
207,950	Jeff Allen, Montrose, CA
145,150	Lori Heape, Hutchinson, KS
86,600	Robert Harmon, Virginia Beach, VA
41,800	Pat Hice, Newton, NC
38,900	Stevie Hice, Newton, NC
POPCORN *(Radio Shack)*	
48,930	★Paul Baker, Pittsburgh, PA
43,970	●Jeff Weaver, Gordonville, PA
39,590	Jeanie Roberts, Watertown, NY
39,470	Nicole Freedman, Wellesley, MA
38,310	Bertha Jeffries, San Bernardino, CA
37,910	Wenlock Burton, Melbourne, Australia
34,910	Ellen Ballinger, Uxbridge, Ontario
31,000	Alfredo Santos, New York, NY
29,780	Sandy Burton, Melbourne, Australia
21,110	James L. Cunrod, Bonaire, GA
PROJECT NEBULA *(Radio Shack)*	
1,145	★Barry Logan, Pinckneyville, IL
1,120	●John Hopkins, Greenville, SC
1,065	William Daley, Biloxi, MS
1,065	Dan Heater, Cortland, OH
995	Dan Bovey, Wheaton, IL
PYRAMID *(Radio Shack)*	
220/137	★Chris Cope, Central, SC
220/147	●Ssg. Danial Pierce, APO San Francisco, CA
220/224	Tony & Hazel Rye, Ingleside, Ontario
220/236	Pat McWhinney, Key Largo, FL
220/289	Douglas G. Oxenreider, Montevideo, MN
220/	Jerome Galba Jr., Rochester, MI
210/	Chris Young, Ft. Worth, TX
Q-NERD (THE RAINBOW)	
6,512,020	★Ray Ravalitera, Bethune, France
184,780	Ray Suplee
181,920	Susan Bennington, Pensacola, FL
27,800	●Richard King, Houston, TX
10,300	Bill Sain, Charlotte, NC
QUASAR COMMANDER *(Radio Shack)*	
114	★Paul Sanecki
RAAKA-TU *(Radio Shack)*	
25	★Brian Sobolewski, Orange Park, FL
40	●David Joyner, Raleigh, NC
RAINBOW ROACH (THE RAINBOW)	
124,800	★Cheryl Endlich, Perry Hall, MD
122,700	Peter MacLeod, Montague, Prince Edward Island
113,500	Andrew Smith, Columbia, SC
102,000	John Statham, Strathroy, Ontario
69,600	Bill Grubbs, Columbus, IN
20,000	Wenlock Burton, Melbourne, Australia
REACTOIDS *(Radio Shack)*	
931,395	★Linda Mobbs, Pt. Huron, MI
203,800	Andrew Lehtola, Mound, MN
88,615	Robbie Anderson, Monrovia, CA
41,100	Jeff Loeb, Mobile, AL
ROBOTTACK *(Intracolor)*	
2,437,000	★Mike Scharf, Fremont, OH
2,216,950	●Randy Hankins, Tabor, IA
1,922,200	Erik Merz, Noblesville, IN
1,512,200	Robert Kiser, Monticello, MS
1,424,300	John Osborne, Kincardine, Ontario
SCARFMAN *(Cornsoft)*	
412,050	★Michael Cerami, Springfield, VA
357,190	Jeremy Schild, Clinton, UT
261,850	Kristin McGahee, Pembroke Pines, FL
253,920	Scott Boulanger, Columbus, OH
SHOOTING GALLERY *(Radio Shack)*	
120,640	★Robert J. Wallace, Waldorf, MD
67,700	Vernell Peterson, Radcliff, KY
44,870	Mark Nichols, Birsay, Saskatchewan
44,480	R. Duguay, St. Bruno, Quebec
31,340	Martin Peterson, Lynchburg, VA
SKIING *(Radio Shack)*	
05.85	★John Hokpins, Greenville, SC
12.08	●Kelly Kerr, Wentzville, MO
13.73	Janell Stroshane, Ashland, WI
21.35	Jean-Claude Taliana, Brossard, Canada
29.52	Andrew Truesdale, Ferguson, MO
44.02	Brad Gaucher, Hinton, Alberta
SLAY THE NEREIS *(Radio Shack)*	
328,521	★Edward Meyer, Vancouver, British Columbia
116,588	Peter MacLeod, Montague, Prince Edward Island
SNAKER (THE RAINBOW)	
1:26	★Dan Sobczak, Mesa, AZ
SOLO POKER *(Datasoft)*	
980	★Carol Dawn Staker, Moscow, ID
850	Granville Bonyata, Tallahasse, FL
740	Allan Mercurio, Portsmouth, RI
450	Kevin Marsh, Bokeelia, FL
SPACE SHUTTLE *(Tom Mix)*	
595	★Steve Schweitzer, Sewell, NJ
585	Kenton Fifield, Fort Francis, Ontario
585	Randall F. Edwards, Dunlap, KS

MORE... RAINBOW SCOREBOARD

576	David J. Banks, Greendale, British Columbia
575	Fred Weissman, Brookline, MA
STORM ARROWS *(Spectral Associates)*	
168,000	★Steven Ohsie, Deer Park, TX
136,650	Brian Specht, Rochester, NY
68,400	Jim Irvine, Sudbury, Ontario
STRATEGY FOOTBALL *(*THE RAINBOW*)*	
201-0	★Dan Sobczak, Mesa, AZ
TIME BANDIT *(MichTron)*	
243,620	★Mark Wooge, Omaha, NE
214,850	Sally Naumann, Hailey, ID
129,240	Brian Larrson, Fridley, MN
106,720	Glen Heidebrecht, Topeka, KS
66,700	Fred Naumann, Hailey, ID
46,330	Rosa Maria Paparis, Williamsburg, VA
28,890	Alfredo Santos, New York, NY
25,610	Pamela Santos, New York, NY
TOUCHSTONE *(Tom Mix)*	
65,520	★Kevin Marsh, Bokeelia, FL
TRAILIN' TAIL *(*THE RAINBOW*)*	
76,275	★Michael Rosenberg, Prestonsburg, KY
33,454	Kenneth Bergenham, Lawton, MI
26,640	Dr. James Peterson, Radcliff, KY
24,415	Kenton Fifield, Fort Frances, Ontario
19,820	Dan Sobczak, Mesa, AZ
TRAPFALL *(Tom Mix)*	
120,406	★Keith Marsh, Bokeelia, FL
114,322	●David Joyner, Raleigh, NC
113,408	Rich Trawick, N. Adams, MI
112,596	Kanti Dinda, Kingston, Ontario
112,404	Russ Rosen, Cardiff, CA
108,000	Sandy Burton, Melbourne, Australia
55,568	Adam Jensen, Racine, WI
TUT'S TOMB *(Mark Data)*	
158,000	★Chris Russo, Miami, FL
121,240	Mickey McCafferty, Oceanside, CA
106,460	Eileen Kaakee, Royal Oak, MI
104,360	Gary Marshall, Layton, UT
98,600	George Kaakee, Royal Oak, MI
61,100	Heidi MacPherson, Pennsville, NJ
WACKY FOOD *(Arcade Animation)*	
227,900	★Jon Jenkins, Milner, GA
105,100	●Stephane Asselin, Hauterive, Quebec
WHIRLYBIRD RUN *(Spectral Associates)*	
516,450	★Dan Shargel, Arroyo Grande, CA
283,100	Nathan Russell, Minco, OK
157,000	Hughens Bien-Aime, Montreal, Quebec
103,900	Dann Fabian, Crestview, FL
98,400	Dave Lubnow, Sussex, NJ
ZAXXON *(Datasoft)*	
1,510,000	★James Quadrella, Brooklyn, NY
666,000	Andy Green, Whitehall, PA
401,900	Mike Hughey, King George, VA
370,400	Chris Coyle, Selden, NY
260,600	Roger Buzard, Lima, OH
127,300	David Iverson, Dorval, Quebec
121,800	Geoff Reber, Clinton, IA
110,900	Donna Siclari, Staten Island, NY
106,600	Dan Thomas, Hanover, PA
94,400	Ronald Jay Gates, Grand Rapids, MI
81,000	Chris Young, Ft. Worth, TX
78,700	Paul Harper, Rimersburg, PA
76,300	Brant Putnam, Tucson, AZ
68,200	James Toth, Punxsutawney, PA
64,800	Jeff Luster, Fairview Park, OH

— Kevin Nickols

SCOREBOARD POINTERS

In conjunction with THE RAINBOW's Scoreboard, we offer this column of pointers for our game-playing readers' benefit. If you have some interesting hints and tips, we encourage you to share them by sending them to the Scoreboard, c/o THE RAINBOW.

THANK YOU, TU

Scoreboard:

First of all, I would just like to say thanks to all the people who helped me on *Raaka-Tu*. I still need help, though, with *Bedlam* and *Madness and the Minotaur*. Please write to me at 230 Yarmouth Rd., 60007.

Larry Evans
Elk Grove Village, IL

GHOST BUSTERS

Scoreboard:

I've found that in the game *Ghost Gobbler* (at least in the old version), *&H2FFE* controls the appearance of the bonus food in screen one, *&H2FFF* does so for screen two, and so on through screen eight. *POKEing* values from eight to 90 into these areas causes interesting bonuses to appear!

Also, you can *POKE &H2700,0* to remove the teleporter or *&H2700,2* to make it work every time.

Steve Clark
Bethlehem, PA

LIFE'S LITTLE PROBLEMS

Scoreboard:

I have a problem concerning Tom Fagan's letter entitled "Life Everlasting" (July '84 RAINBOW). I tried his *POKE* for *Zaxxon*, but it didn't work. The problem I had was simply not knowing what to type and when to type it. Could you please help me?

Ronald Gates
Grand Rapids, MI

Editor's Note: To use the "immortality" *POKEs*, you must first *LOADM* the game (the given *POKE* is for the disk version of *Zaxxon* only). Then, before *EXECuting* it, type *POKE &H6418,x* (where 'x' is any number between 1 and 255) and ENTER. Then type *EXEC* and ENTER. For games that *EXECute* automatically, you may be able to hit the Reset button and then enter the *POKE*.

CAVERN COPTER REVISITED

Scoreboard:

I read the letter in the July '84 issue about *Cavern Copter* (Feb. '84 RAINBOW). I think it works very well and I have a way to make it a little better.

In order to get as many lasers as you want, *EDIT* Line 752 (*IF F=3*) and change the three to any number you want. [Then] *EDIT* Line 235 [and] change the three to whatever number you picked:

> 235 DATA "You have three lasers for the entire mission, but you can't use any in the last cavern."

I think this [makes it] a little easier to get past the creatures, [since] you don't run out of lasers at the wrong time!

Dan Sobczak
Mesa, AZ

BUSTIN' OUT

Scoreboard:

For those of you having trouble with *Bedlam*, listen up. You go into the room that has the window hook and get the red key by just typing in GET RED KEY WITH HOOK. To get the green key, stand outside the shock room and GET GREEN KEY WITH HOOK. (If the doctor injects you, just type PLUGH and you'll be cured.) Open all doors until you come to the hallway which leads into the next section. Then, find the refrigerator, PUT PILL IN HAMBURGER, and give it to the dog. If the dog croaks, go out the door. When the guards put you in a room, OPEN GREEN DOOR WITH GREEN KEY and you're free.

In *Raaka-Tu*, you can kill the gargoyle by lighting the green candle in the room. Also, be careful of the teleportation rooms. Drop the ring once and pick it up again.

If *anyone* can figure out *Karrak* (Feb. '84 RAINBOW), please let me know. I — like everyone else — am stuck at the pit and slot.

Peter McIntyre
Agana, Guam

KARRAK THE INVINCIBLE

Scoreboard:

I am having a lot of trouble with *The Amazing Adventures of Karrak* (Feb. '84 RAINBOW). I can't get past the pit in the first game. If anyone has any answers to this game, please send them to 11654 Plaza Dr., Apt. 5, 48420.

Daniel Bee
Clio, MI

Scoreboard:

Great news for all you worn out Adventurers! I have answers to some of the most popular Adventures out today. They include *Raaka-Tu, Pyramid, Sands of Egypt, Bedlam, Tower of Fear, Black Sanctum, Shenanigans, Seaquest*, and any of the Adventures published in THE RAINBOW. I should also have *Madness and the Minotaur* and *Alice in Wonderland* solved by the time this is printed. For $1, I will send a folder with step-by-step answers to the Adventure requested. Write to me at 2402 Pretty Bayou Dr., 32405.

If you send me an Adventure that I cannot solve I will pay $10 for the solution (must be a legitimate Adventure with a solution). I am quite sure this will please any Adventurer.

Also, if there are any CoCoers in the Panama City area, give me a call at (904) 763-1606. I have a few Adventures of my own.

Ryan Elam
Panama City, FL

BULLHEADED PROBLEM SOLVERS

Scoreboard:

I am having a difficult time with *Madness and the Minotaur*. I would like to hear from anyone who can give me a map or can tell me: 1) how to get out of the maze, 2) how to get a shield, 3) how to get rid of the monsters, or 4) how to score all the points. Write to me at Box 111, 55016.

Dan Johnson
Cottage Grove, MN

Scoreboard:

I'm a real fan of Adventure games and now I need some help. If anyone can help me in getting spells in *Madness and the Minotaur*, write to me at Rt. 4 Wardsville Rd., 65101.

Kevin Green
Jefferson City, MO

LIFE IN THE DUNGEONS

Scoreboard:

I have the cartridge of *Dungeons of Daggorath* and have been great so far. But on the third level I come to the wizards image and he kills me after I get one shot in.

What I would like to know is how to kill that sucker? If you can help, write to me at SS#3 East Beaverly Rd., V2N 2S7.

Mike Schneider
Prince George, British Columbia

Scoreboard:

I need help with the Radio Shack Adventure *Dungeons of Daggorath*. What I need is a list of the rings and the words to incant them. Also, if possible, maps of the different levels. If anyone can help me, please write to P.O. Box 555, 78040.

Fred Turner
Laredo, TX

Scoreboard:

I've talked to many CoCo users who have played the *Dungeons of Daggorath* Adventure game. All say the wizard can't be slain. Well, I have slain the wizard twice, first in 30 hours and then in 14 — and on the original CoCo tablet keyboard. Typing speed and accuracy, sequencing creature destruction, husbanding limited resources, and plotting logical strategies are the keys to getting all five levels cleared. (Hint: You need a good dictionary to incant the last ring.)

I caution the user that this Adventure is very stressful and frustrating. You must make many saves ("ZS"). Split-second coordination is mandatory. Expect to "ZS" at least 150 times the first time around and about 30 times the second.

The third level is the most difficult, followed by the fourth, second, fifth and first in that order. You've really accomplished a masterful milestone when you see the last message: "Behold! Destiny . . ." (It's not cricket to give all the secrets away.) The new wizard sports a new model scepter, too!

L. Grant Shideler
Lakewood, CO

NEVER ENOUGH MONEY

Scoreboard:

I am having trouble with *Raaka-Tu*. How are you able to get 50 points when you must get rid of the coin (five points) so as to not get shot by the statue? It's the same with *Pyramid*; how do I get points for the coins when, almost every game, I have to get new batteries. Also, *Madness and the Minotaur* has me completely stumped.

If you can help me through these problems, please send the answers to 184-D Main St., 06786.

Kenny Neill
Terryville, CT

Scoreboard:

I have solved the following Adventures: *Bedlam, Pyramid, Raaka-Tu, Black Sanctum, Calixto Island, Shenanigans*, and *Ghost Town*. If anyone needs help, send an SASE to 57 Cardinal Dr., 11576.

Mike Sitzer
Roslyn, NY

THE WRATH OF RAAKA-TU

Scoreboard:

I have some clues for *Raaka-Tu*. To get out (from the idol room), type GO UNDER ALTAR. Also, you can use the candle to kill the gargoyle.

I need help finding the last treasure in *Raaka-Tu* and I need help with *everything* in *Sands of Egypt*. Write to me at 914 Albany Ct., 27609.

David Joyner
Raleigh, NC

Scoreboard:

I would like to know how to get across the rug in *Raaka-Tu*. I also would like to know where the potion is (I have done some programs published in THE RAINBOW that reveal the objects in the game). Please help me! Write to me at Box 116, 72843.

Chuck Poynter
Hector, AR

Scoreboard:

In the May '84 issue of THE RAINBOW there was a letter that revealed the answer to my favorite Adventure game, *Raaka-Tu*. When I saw that answer I could have died, because I had spent hours sitting there staring at my monitor trying to think of a command that would get me over the pit and through the wooden door. The end to that Adventure was a giant let-down. It was like the author couldn't think of anything else, so he just did that.

Mike Sengstock
Meriden, CT

TURN OF THE SCREW

The Halt Pin And Its Function

By Tony DiStefano
Rainbow Contributing Editor

A while ago I wrote about the pins' functions on the cartridge connector of your computer. One of the pins was the "HALT" pin, which is the center of discussion for this month.

The HALT pin is not one of the most popular pins. Certainly not as popular as, let's say, an address line or a data line. Address and data lines are used continuously while the HALT line can sit idly forever. In fact, if you don't have a disk controller or anything else plugged in the cartridge slot, the HALT line will not be used. The disk drive controller always uses the HALT line to do its I/O.

What does the HALT line do? It does what it says it does — halt. When this line is logically high (five volts), it is inactive. But once the HALT line goes low, at zero volts, many things start happening. The CPU will stop. First of all, the CPU will finish its current instruction, which takes between two to 15 clock cycles, depending on what instruction the CPU was executing. Then the CPU will tristate the address bus and the data bus, which means the CPU will neither input nor output — it is inactive. Everything stops, however, nothing is lost. When halted, the BA (Bus Available) and the BS (Bus Status) lines will go high. This indicates that the CPU is in the halt state. You don't have to worry about these lines; Radio Shack chose not to use them by not bringing them to the cartridge connector. The CPU registers are all preserved and the RAM (random access memory) is still refreshed. That's the SAM chip's job.

Everything will stay halted until the HALT line returns to a high state. Then the CPU will continue just as before. While halted, the CPU will not respond to external real-time requests such as the Interrupt Request or the Fast Interrupt Request. The Non-Maskable Interrupt and the Reset will be latched for later request. Stopping the CPU will usually not cause any problems, but under certain conditions, problems can occur. This is when the CPU is involved in critical timing. Examples are cassette or disk I/O; timekeeping or serial I/O like printer; or modem I/O. If the CPU is HALTed during these and other timing conditions, loss of data or complete scrambling of data is eminent. Timing loops can be thrown off, so stay away from the halt line when doing I/O or timing.

> ***"The HALT line has a multitude of uses. The most useful and practical is to slow down a BASIC listing."***

What could one use the HALT line for if one had control of it? Well, there are a multitude of uses. The most useful and practical is to slow down a BASIC listing. You know, when you do a *LIST* and a long flash of text just streams by? Well, you could slow that down to a reasonable speed using the halt line. Another use is to study, step by step, how the CPU draws graphics. You study the different techniques programmers use to draw and move objects on the Hi-Res graphics screen. A third use is to study how BASIC commands function such as *PRINT* and *SET* and *RESET*.

Now that you know all about the HALT line and what useful things you can do with it, let me show you how to put together a small circuit that will let

(Tony DiStefano is well known as an early specialist in Color Computer hardware projects. He is one of the acknowledged experts on the "insides" of CoCo.)

you control the HALT line. First you will need parts, which are listed in Table 1. You will also need the standard "tool kit" for assembling. It is not a very difficult circuit to put together, just the usual parts. Follow the diagram in Figure 1, and put the circuit together. Use the socket for the IC. When you are finished plug the board into the ROM Pak of the CoCo or any one of the slots of the Multi-Pak Interface. It will also work with the CoCo 2. You might want to put the switches and the pot on another small board with remote wires so that it would be more accessible when using it. Also if the rapid fire mode is too fast or slow, try changing the value of C2. The lower the value, the faster it will go and vice versa. Try a .001 to a .01 capacitor.

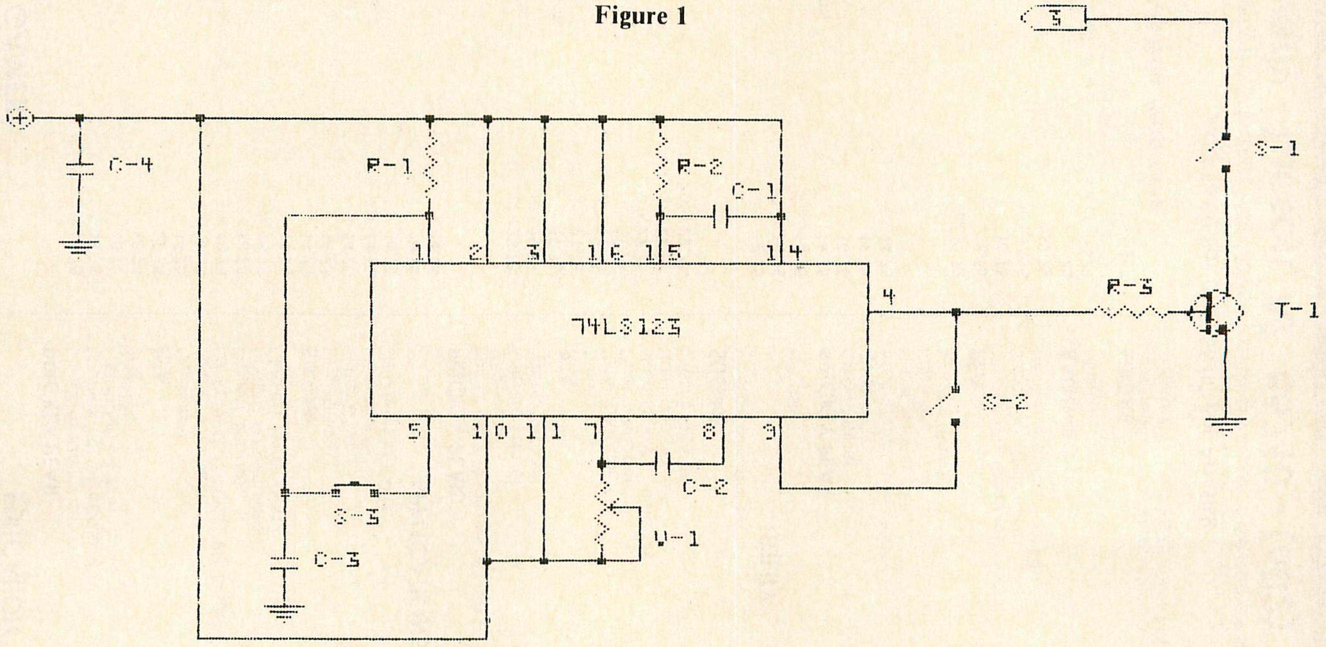
With switches 1 and 2 off, turn on the computer. Everything should work normally. Now turn switch 1 on. The cursor should stop. Press the push-button several times. The cursor will flash occasionally. Turn on switch 2. When you push the button, the cursor should start to flash slowly. Turn the potentiometer from one end to the other. The cursor should speed up and slow down. That is your speed control when switch 2 is on. When switch 2 is off, the push button acts like a single stepper. When it is on, it is rapid fire. When switch 1 is off, the whole thing is disabled. The task is complete. I'm sure that you will find many uses for the HALT line.

Table 1

PARTS LIST

ID	**DESCRIPTION**
R1,2,3	1K OHMS ½ WATT
V1	500K OHMS POTENTIOMETER
C1	150 PF 10 VOLTS
C2	.005 MF 10 VOLTS
C3,4	.1 MF 10 VOLTS
IC1	74LS123
T1	2N3904
S1,S2	SPST SWITCH
S3	MOMENTARY PUSH ON SWITCH
PCB	PROTO-BOARD (RGS MICRO)
—	16 PIN SOCKET

Figure 1



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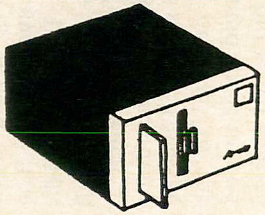

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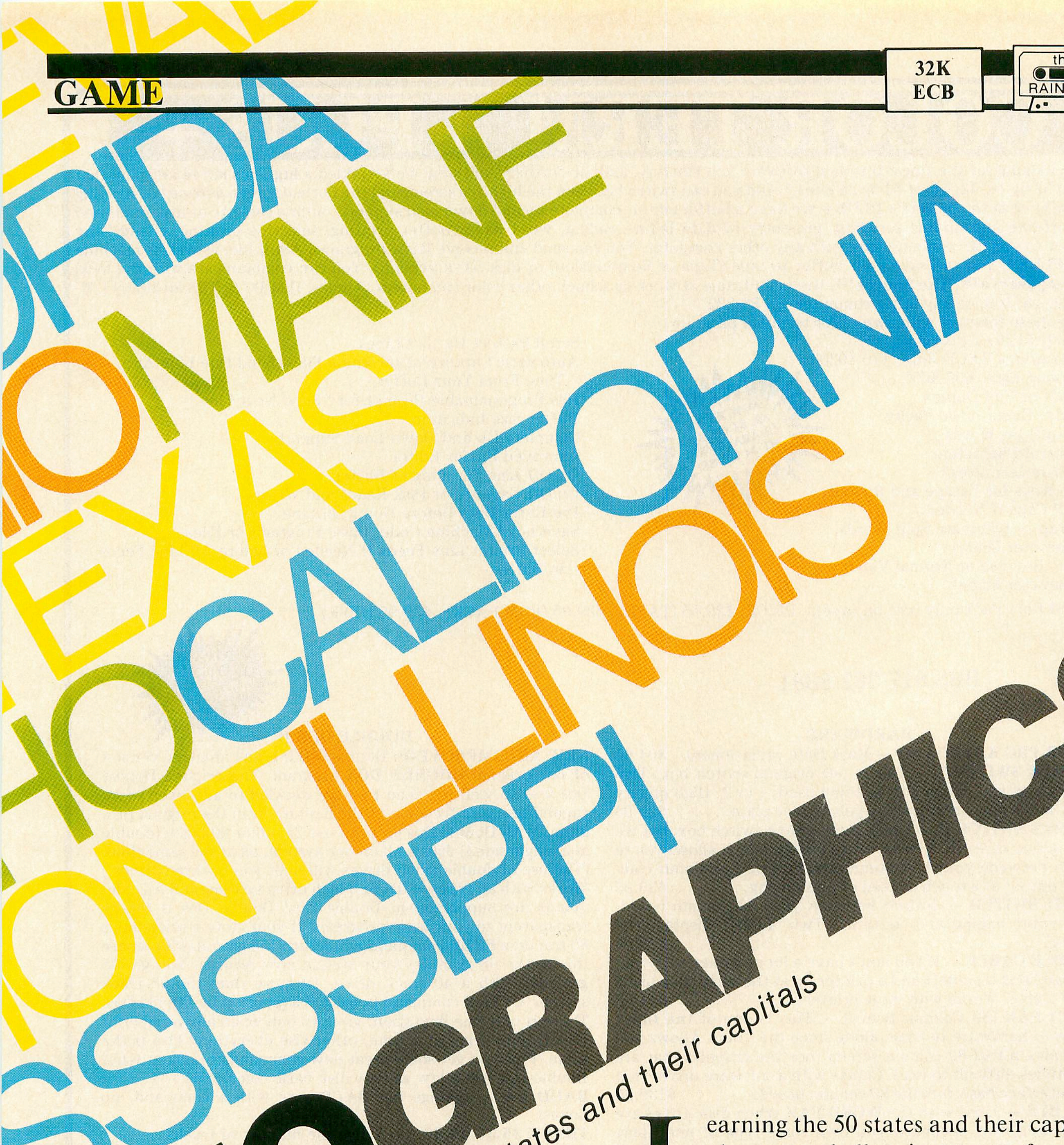

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Program by Joseph S. Paravati

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SCROLL 1-255 ... change the screen scrolling speed.

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PRICES:	**DOUBLE 80 PLUS** (80 column board)	$99.95
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	ULTRA TERM+ (disk only)	55.95

state is located. Again, type in the correct name and your score will be given. So, get out your Atlas or your old geography book and study those states. I could've sworn that Miami was the capital of Florida.

— Noreen Morrison

(Joseph Paravati, now retired, was an electronics troubleshooter for the New York City Bus Company. He is a self-taught computer hobbyist who started programming in December 1981 in order to occupy his spare time and give his three children a head start with computers.)

110	217	1580	1
170	16	1920	229
280	97	2170	194
630	242	5160	121
960	85	5360	204
1280	226	END	182

The listing:

```
10 ' ***GEOGRAPHY LESSON*** 3/83
     BY J.S.PARAVATI
20 R=RND(-TIMER):NU=0
30 CLS0:PRINT@234,"GEOGRAPHY GAM
E";:PRINT @480,"BY J.S.PARAVATI
 3/83";
40 DIM X(50),Y(50),S$(50),P$(50)
50 FOR N=1 TO 50
60 READ X(N),Y(N):NEXT N
70 DATA 16,63,16,39,20,27,38,39,
28,60,48,57,44,87,68,81,76,60,72
,51,60,24,96,27,96,40,124,51,124
,66,116,81,124,100,140,36,140,48
,148,66,148,84,156,108,160,36,16
4,57,188,69
80 DATA 212,69,208,81,172,81,168
,99,184,99,200,93,192,108,216,90
,184,54,196,54,206,62,216,60,222
,62,224,54,216,51,188,33,224,33,
232,45,242,42,236,38,232,30,238,
30,240,18,44,156,88,144
90 FOR N=1 TO 50:READ S$(N),P$(N
):NEXT N
100 DATA CALIFORNIA,SACRAMENTO,O
REGON,SALEM,WASHINGTON,OLYMPIA,I
DAHO,BOISE,NEVADA,CARSON CITY,UT
AH,SALT LAKE CITY,ARIZONA,PHOENI
X,NEW MEXICO,SANTA FE,COLORADO,D
ENVER,WYOMING,CHEYENNE
110 DATA MONTANA,HELENA,NORTH DA
KOTA,BISMARCK,SOUTH DAKOTA,PIERR
E,NEBRASKA,LINCOLN,KANSAS,TOPEKA
,OKLAHOMA,OKLAHOMA CITY,TEXAS,AU
STIN,MINNESOTA,SAINT PAUL,IOWA,D
ES MOINES,MISSOURI,JEFFERSON CIT
Y,ARKANSAS,LITTLE ROCK,LOUISIANA
,BATON ROUGE
120 DATA WISCONSIN,MADISON,ILLIN
OIS,SPRINGFIELD,KENTUCKY,FRANKFO
RT,VIRGINIA,RICHMOND,NORTH CAROL
INA,RALEIGH,TENNESSEE,NASHVILLE,
MISSISSIPPI,JACKSON,ALABAMA,MONT
GOMERY,GEORGIA,ATLANTA,FLORIDA,T
ALLAHASSEE,SOUTH CAROLINA,COLUMB
IA
130 DATA INDIANA,INDIANAPOLIS,OH
IO,COLUMBUS,WEST VIRGINIA,CHARLE
STON,MARYLAND,ANNAPOLIS,DELAWARE
,DOVER,NEW JERSEY,TRENTON,PENNSY
LVANIA,HARRISBURG,MICHIGAN,LANSI
NG,NEW YORK,ALBANY,CONNECTICUT,H
ARTFORD
140 DATA RHODE ISLAND,PROVIDENCE
,MASSACHUSETTS,BOSTON,VERMONT,MO
NTPELIER,NEW HAMPSHIRE,CONCORD,M
AINE,AUGUSTA,ALASKA,JUNEAU,HAWAI
I,HONOLULU
150 GOSUB 5000
160 CLS:PRINT @4,"***STATES AND
CAPITALS***":PRINT STRING$(32,"*
")
170 PRINT "TYPE IN AND <ENTER> C
ORRECT      STATE WHICH IS SHOWN
ON MAP.     10 POINTS FOR CORRECT
 ANSWER -10FOR WRONG ANSWER. THE
N TYPE AND <ENTER> CORRECT CAPIT
AL FOR SAMESTATE. CAPITAL FLASHE
S ON AND    OFF WHEN IT IS TIME T
O TYPE IN   CAPITAL."
180 PRINT "20 POINTS FOR CORRECT
 ANSWER,    -20 FOR WRONG ONE."
190 PRINT @482,"<PRESS ANY KEY T
O CONTINUE>";
200 K$=INKEY$:IF K$="" THEN 200
210 S=1
220 CLS:PRINT "MAP SHOULD BE BLU
E. IF NOT THEN USE <RESET BUTTON
> AND RE-RUN.  DO THIS AS MANY T
IMES AS NEEDED UNTIL MAP IS BLUE
."
230 PRINT:PRINT "DURING GAME YOU
 MAY PRESS <DOWN ARROW> KEY TO G
ET A BLACK ON    GREEN COLOR SET
.":PRINT:PRINT "IF YOU TYPE IN W
RONG ANSWER OR  SPELLING IS WRON
G THE COMPUTER  WILL GIVE RIGHT
ANSWER."
240 PRINT @485,"<PRESS ANY KEY T
O START>";
250 K$=INKEY$:IF K$="" THEN 250
260 PMODE4,1:PCLS0:SCREEN1,S
```

```
270 PMODE3
280 COLOR 8
290 ' UNITED STATES MAP
300 CIRCLE(90,15),72,,.08,0,.5
310 CIRCLE(18,52),12,,3,.25,.75
320 LINE(18,88)-(30,88),PSET
330 LINE-(48,98),PSET
340 LINE-(64,98),PSET
350 LINE-(64,94),PSET
360 LINE-(76,94),PSET
370 LINE-(84,99),PSET
380 LINE-(84,108),PSET
390 LINE-(96,117),PSET
400 LINE-(98,117),PSET
410 LINE-(104,108),PSET
420 LINE-(112,108),PSET
430 LINE-(132,132),PSET
440 LINE-(140,134),PSET
450 LINE-(138,123),PSET
460 LINE-(144,114),PSET
470 LINE-(156,114),PSET
480 LINE-(160,111),PSET
490 LINE-(172,109),PSET
500 LINE-(188,111),PSET
510 LINE-(200,120),PSET
520 LINE-(208,141),PSET
530 LINE-(212,143),PSET
540 LINE-(216,138),PSET
550 LINE-(212,108),PSET
560 LINE-(230,76),PSET
570 LINE-(224,74),PSET
580 LINE-(228,48),PSET
590 LINE-(244,44),PSET
600 LINE-(240,30),PSET
610 LINE-(252,15),PSET
620 LINE-(248,12),PSET
630 LINE-(244,3),PSET
640 LINE-(242,3),PSET
650 LINE-(232,18),PSET
660 LINE-(216,20),PSET
670 LINE-(206,43),PSET
680 LINE-(196,45),PSET
690 LINE-(195,45),PSET
700 LINE-(196,24),PSET
710 LINE-(192,12),PSET
720 LINE-(184,14),PSET
730 LINE-(180,21),PSET
740 LINE-(184,45),PSET
750 LINE(172,45)-(168,24),PSET
760 LINE-(164,15),PSET
770 LINE(172,45)-(184,45),PSET
780 PAINT(128,96),6,8
790 ' ********************
800 ' STATES
810 LINE(30,88)-(34,84),PSET
820 LINE-(20,60),PSET
```

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```
830 LINE-(20,48),PSET
840 LINE-(8,48),PSET
850 LINE(58,98)-(58,74),PSET
860 LINE-(38,74),PSET
870 LINE-(38,78),PSET
880 LINE-(35,78),PSET
890 LINE-(33,80),PSET
900 LINE(38,74)-(38,48),PSET
910 LINE-(20,48),PSET
920 LINE(58,74)-(58,54),PSET
930 LINE-(52,54),PSET
940 LINE-(52,48),PSET
950 LINE-(38,48),PSET
960 LINE(52,54)-(78,37),PSET,B
970 LINE-(78,20),PSET
980 LINE(10,32)-(32,32),PSET
990 LINE-(32,48),PSET
1000 LINE(32,18)-(32,48),PSET
1010 LINE(40,18)-(52,39),PSET
1020 LINE(58,54)-(92,75),PSET,B
1030 LINE(86,75)-(86,92),PSET
1040 LINE-(74,92),PSET
1050 LINE-(76,93),PSET
1060 LINE(88,75)-(140,75),PSET
1070 LINE-(140,88),PSET
1080 LINE-(105,86),PSET
1090 LINE-(105,80),PSET
1100 LINE-(88,80),PSET
1110 LINE(140,88)-(146,90),PSET
1120 LINE-(146,96),PSET
1130 LINE-(150,102),PSET
1140 LINE-(148,114),PSET
1150 LINE(92,58)-(138,75),PSET,B
1160 LINE(78,20)-(114,33),PSET,B
1170 LINE(78,45)-(114,33),PSET,B
1180 LINE(150,42)-(115,42),PSET
1190 LINE-(126,45),PSET
1200 LINE-(132,51),PSET
1210 LINE-(138,57),PSET
1220 LINE(150,30)-(152,17),PSET
1230 LINE-(148,36),PSET
1240 LINE-(152,42),PSET
1250 LINE-(152,45),PSET
1260 LINE-(156,48),PSET:LINE-(15
6,51),PSET
1270 LINE-(152,54),PSET
1280 LINE-(136,54),PSET
1290 LINE(140,76)-(160,76),PSET
1300 LINE-(156,93),PSET
1310 LINE-(148,93),PSET
1320 LINE(160,86)-(176,86),PSET
1330 LINE-(176,108),PSET
1340 LINE(156,93)-(160,96),PSET
1350 LINE-(160,105),PSET
1360 LINE-(168,105),PSET
1370 LINE-(168,110),PSET
1380 LINE(176,86)-(192,86),PSET
1390 LINE-(196,102),PSET
1400 LINE-(196,106),PSET
1410 LINE-(180,106),PSET
1420 LINE-(180,110),PSET
1430 LINE(196,106)-(212,106),PSE
T
1440 LINE(192,86)-(208,86),PSET
1450 LINE-(216,102),PSET
1460 LINE(208,86)-(216,84),PSET
1470 LINE-(224,87),PSET
1480 LINE(160,76)-(228,76),PSET
1490 LINE(192,86)-(196,77),PSET
1500 LINE(152,54)-(160,75),PSET
1510 LINE-(180,63),PSET
1520 LINE-(184,66),PSET
1530 LINE-(190,66),PSET
1540 LINE-(198,68),PSET
1550 LINE-(192,75),PSET
1560 LINE(190,65)-(190,45),PSET
1570 LINE-(176,45),PSET
1580 LINE-(176,51),PSET
1590 LINE-(171,67),PSET
1600 LINE(152,45)-(176,45),PSET
1610 LINE(192,45)-(204,45),PSET
1620 LINE-(204,57),PSET
1630 LINE-(198,68),PSET
1640 LINE-(208,66),PSET
1650 LINE-(216,63),PSET
1660 LINE-(224,69),PSET
1670 LINE(204,57)-(216,63),PSET
```

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```
1680 LINE(204,45)-(220,45),PSET
1690 LINE-(222,51),PSET
1700 LINE-(220,54),PSET
1710 LINE-(222,57),PSET
1720 LINE-(204,57),PSET
1730 LINE(220,57)-(220,66),PSET
1740 LINE(226,60)-(220,57),PSET
1750 LINE(222,45)-(228,51),PSET
1760 LINE-(228,20),PSET
1770 LINE(228,42)-(238,40),PSET
1780 LINE-(240,45),PSET
1790 LINE(238,40)-(242,38),PSET
1800 LINE(228,36)-(240,34),PSET
1810 LINE(232,18)-(234,34),PSET
1820 LINE(236,15)-(240,30),PSET
1830 LINE(2,130)-(124,176),PSET,
B
1840 PAINT(92,156),6,8
1850 LINE(48,134)-(52,165),PSET
1860 LINE-(44,162),PSET
1870 LINE-(36,168),PSET
1880 LINE-(12,174),PSET
1890 LINE-(28,165),PSET
1900 LINE-(20,162),PSET
1910 LINE-(16,153),PSET
1920 LINE-(20,144),PSET
1930 LINE-(16,138),PSET
1940 LINE-(24,132),PSET
1950 LINE-(48,134),PSET
1960 LINE(64,130)-(64,176),PSET
1970 CIRCLE(72,138),5,,.5
1980 CIRCLE(88,144),4,,.8
1990 CIRCLE(100,150),4,,.4
2000 CIRCLE(104,156),4,,.5
2010 CIRCLE(108,168),6,,1.3
2020 LINE(128,150)-(250,170),PSE
T,BF
2030 A$="SCORE":DRAW"S8C6BM130,1
68":GOSUB 5080
2040 NU=NU+1:IF NU=1 THEN R=RND(
50) ELSE NU=0
2050 C$="":DRAW"BM50,190"
2060 PAINT(X(R),Y(R)),7,8
2070 IF R=50 THEN PAINT(108,168)
,7,8
2080 IF NU=1 THEN 2110
2090 CIRCLE(X(R),Y(R)),1,8,.9
2100 CIRCLE(X(R),Y(R)),1,7,.9
2110 Z$=INKEY$:IF Z$="" THEN 206
0
2120 A$=Z$:DRAW"S8C7BM+0,0":GOSU
B 5080:IF A$=>" " AND A$=<"Z" TH
EN C$=C$+A$:SOUND 5*R,2
2130 IF Z$=CHR$(13) THEN A$=C$:G
OSUB 2230:GOTO 2040
2150 IF Z$=CHR$(10) THEN 2160 EL
SE 2060
2160 S=NOT S AND 1 OR 0
2170 PMODE4,1:SCREEN 1,S:PMODE3
```

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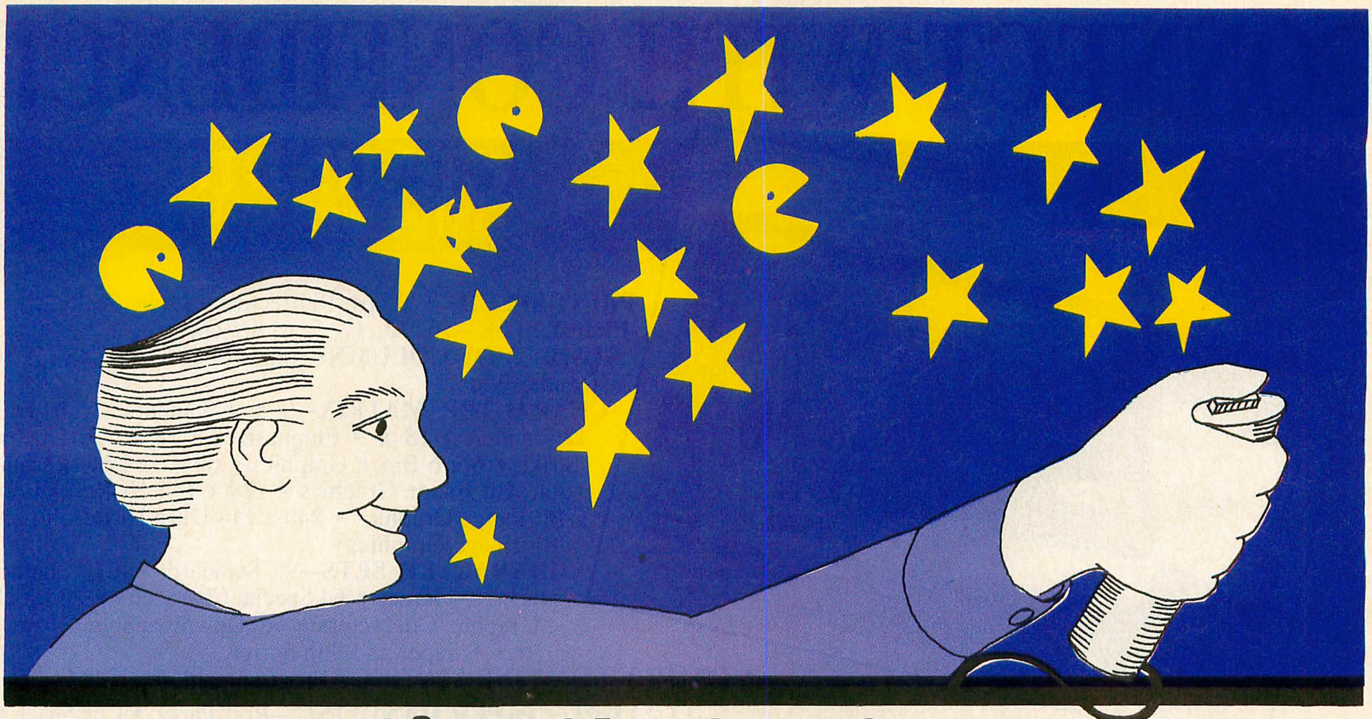
```
2180 GOTO 2110
2220 '************************
2230 IF NU=1 THEN IF C$=S$(R) TH
EN SC=SC+10:SOUND 130,3:SOUND 19
0,3 ELSE SC=SC-10:SOUND 10,5
2240 IF NU<>1 THEN IF C$=P$(R) T
HEN SC=SC+20:SOUND 130,3:SOUND 1
90,3 ELSE SC=SC-20:SOUND 5,5
2245 IF SC=>1000 THEN SC=SC-1000
2250 A$=STR$(SC):COLOR 8:LINE(19
7,170)-(250,150),PSET,BF:DRAW"C7
BM194,168":GOSUB 5080
2260 IF NU=1 THEN IF C$<>S$(R) T
HEN PAINT(10,188),5,8:DRAW"S8C7B
M50,190":A$=S$(R):GOSUB 5080:FOR
 T=1 TO 400:NEXT T
2270 IF NU<>1 THEN IF C$<>P$(R)
THEN PAINT(10,188),5,8:DRAW"S8C7
BM50,190":A$=P$(R):GOSUB 5080:FO
R T=1 TO 400:NEXT T
2280 PAINT(10,188),5,8
2290 IF NU<>1 THEN PAINT(X(R),Y(
R)),6,8:IF R=50 THEN PAINT(108,1
68),6,8
2300 RETURN
5000 ' ***CHRACTER GEN.<2>***
      ***SUB-ROUTINE***
5010 '
5020 'SUBROUTINE MAIN PROGRAM BY
 J.S.PARAVATI  DATA FROM TRS-80
NEWS 4/82--R. VAN DYKE
5030 '
5040 DIM X$(38),Y$(38)
5050 FOR N=1 TO 38
5060 READ X$(N),Y$(N)
5070 NEXT N
5080 '
5090 DRAW B$
5100 FOR J=1 TO LEN(A$)
5110 FOR L=1 TO 38
5120 IF MID$(A$,J,1)=X$(L) THEN
DRAW Y$(L):GOTO5140
5130 NEXT L
5140 NEXT J
5150 RETURN
5160 DATA " ","BM+7,0"
5170 DATA "A","U4E2F2D2NL4D2;BM+
3,0"
5180 DATA "B","U6R3F1D1G1NL3F1D1
G1L3;BM+7,0"
5190 DATA "C","BM+1,-0;H1U4E1R2F
1;BM+0,+4;G1L2;BM+6,0"
5200 DATA "D","U6R3F1D4G1L3;BM+7
,0"
5210 DATA "E","NR4U3NR2U3R4;BM+3
,+6"
5220 DATA "F","U3NR2U3R4;BM+3,+6
"
5230 DATA "G","BM+1,-0;H1U4E1R2F
1;BM+0,+2;NL1D2G1L2;BM+6,0"
5240 DATA "H","U3NU3R4NU3D3;BM+3
,0"
5250 DATA "I","BM+1,0;R1NR1U6NL1
R1;BM+4,+6"
5260 DATA "J","BM+0,-1;F1R1E1U5N
L1R1;BM+3,6"
5270 DATA "K","U3NU3R1NE3F3;BM+3
,0"
5280 DATA "L","NU6R4U1;BM+3,+1"
5290 DATA "M","U6F2ND1E2D6;BM+3,
0"
5300 DATA "N","U6F1D1F2D1F1NU6;B
M+3,0"
5310 DATA "O","BM+1,0;H1U4E1R2F1
D4G1L2;BM+6,0"
5320 DATA "P","U6R3F1D1G1L3;BM+7
,3"
5330 DATA "Q","BM+1,0;H1U4E1R2F1
D3G1NH1NF1G1L1;BM+6,0"
5340 DATA "R","U6R3F1D1G1L2NL1F3
;BM+3,0"
5350 DATA "S","BM+0,-1;F1R2E1U1H
1L2H1U1E1R2F1;BM+3,+5"
5360 DATA "T","BM+2,+0;U6NL2R2;B
M+3,+6"
5370 DATA "U","BM+0,-1;NU5F1R2E1
U5;BM+3,6"
5380 DATA "V","BM+0,-6;D2F1D1F1N
D1E1U1E1U2;BM+3,+6"
5390 DATA "W","NU6E2NU1F2U6;BM+3
,6"
5400 DATA "X","U1E4U1;BM-4,0;D1F
4D1;BM+3,0"
5410 DATA "Y","BM+0,-6;D2F2ND2E2
U2;BM+3,6"
5420 DATA "Z","NR4U1E4U1L4;BM+7,
6"
5430 DATA "1","BM+1,0;R1NR1U6G1;
BM+6,+5"
5440 DATA "2","NR4U1E1R1E2U1H1L2
G1;BM+7,+5"
5450 DATA "3","BM+0,-1;F1R2E1H2E
2H1L3;BM+7,6"
5460 DATA "4","BM+3,0;U2NR1L3U1E
3D3;BM+4,3"
5470 DATA "5","BM+0,-1;F1R2E1U2H
1L3U2R4;BM+3,+6"
5480 DATA "6","BM+4,-5;H1L2G1D4F
1R2E1U1H1L3;BM+7,+3"
5490 DATA "7","U1E4U1L4;BM+7,+6"
5500 DATA "8","BM+1,-0;H1U1E1H1U
1E1R2F1D1G1NL2F1D1G1L2;BM+6,0"
5510 DATA "9","BM+0,-1;F1R2E1U4H
1L2G1D1F1R2;BM+4,+3"
5520 DATA "0","BM+1,0;H1U4E1R2F1
D4G1L2;BM+6,0"
5530 DATA "-","BM+2,-3;R2;BM+3,+
3"
```



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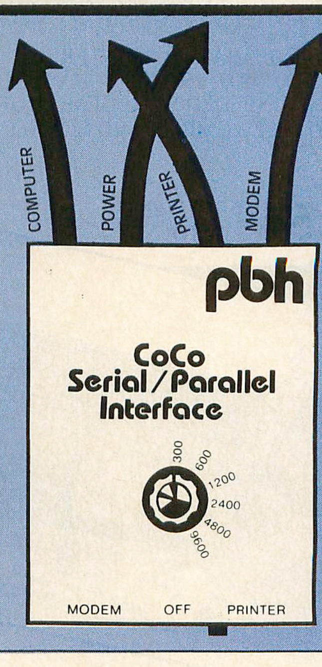

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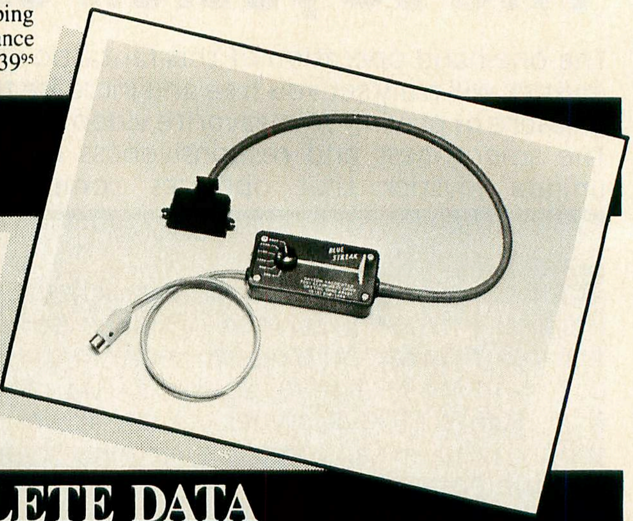

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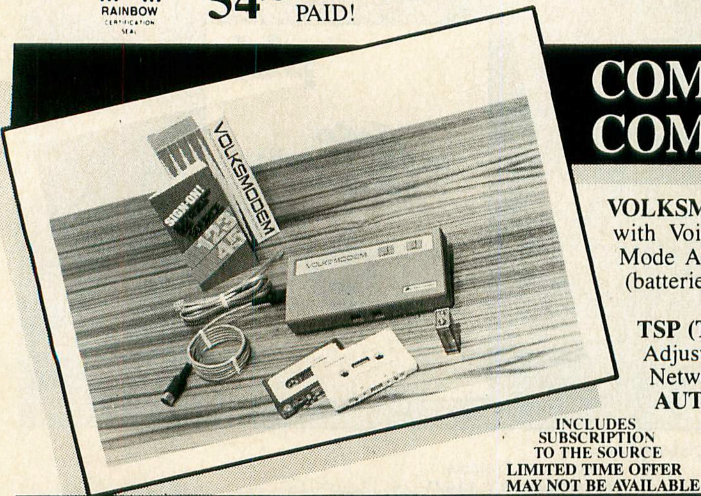

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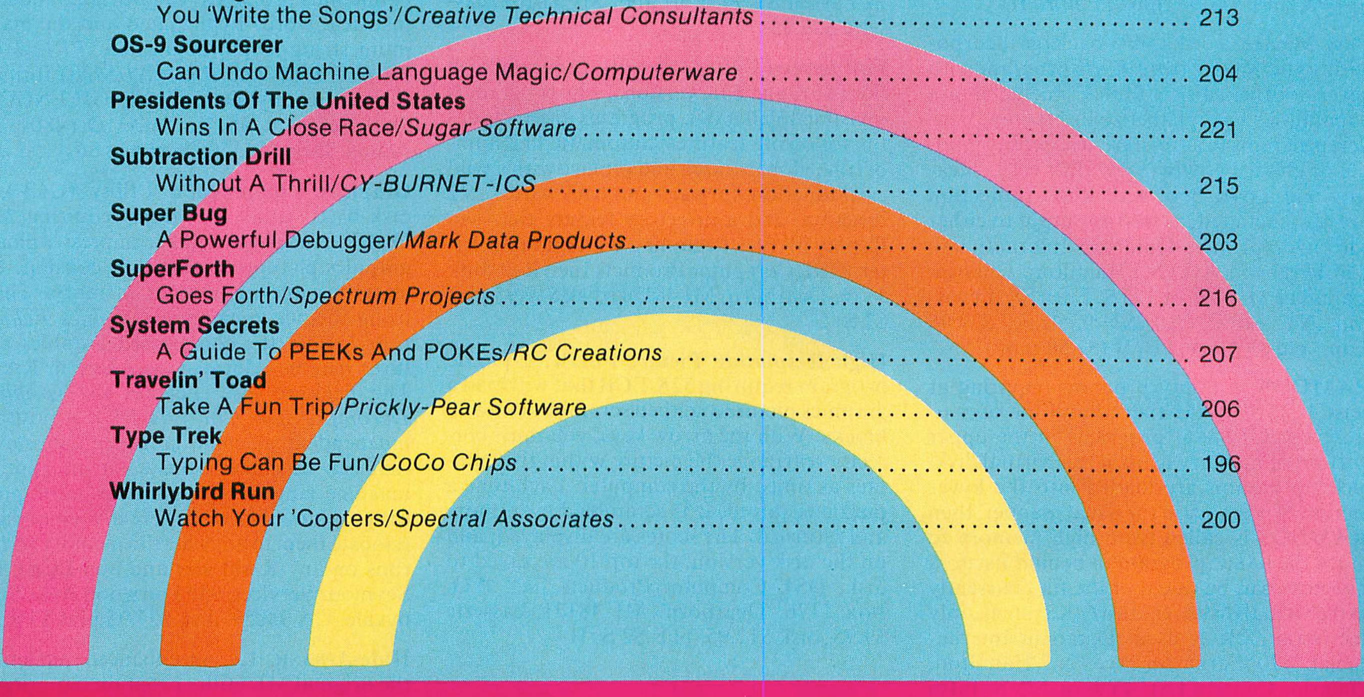

RECEIVED & CERTIFIED

The following products recently have been received by THE RAINBOW, examined by our magazine staff and approved for the *Rainbow Seal of Certification*, your assurance that we have seen the product and have ascertained that it is what it purports to be. This month the *Seal of Certification* has been issued to:

LOGO Starter, a tutoring program requiring 16K for use in conjunction with Radio Shack's *Color LOGO* language Program Pak. The program introduces children to computers through the LOGO language without the need for learning the language or typing program lines. B&B Software, P.O. Box 210, Jenkintown, PA 19046, cassette $13.95

Speak Up! 2.0, an ML voice synthesizer program requiring at least 16K of RAM. The program converts text to speech and can be used to make BASIC programs talk. Version 2.0 is identical to the original *Speak Up!* except that the voice is somewhat clearer and a bug that caused a printer to print randomly has been fixed. Classical Computing, Inc., Box 3318, Chapel Hill, NC 27515, 16K/32K cassette $29.95 postage paid

Number And Color Words, an educational program requiring 32K ECB and designed for preschool children through the second grade. The program aids in the recognition and spelling of the number words zero through nineteen and color words red, green, yellow, orange and white. Large graphic letters are featured, musical rewards are provided for each correct answer, and the talking version utilizes speech synthesis when used in conjunction with The Voice speech synthesizer. CY-BURNET-ICS, 5705 Chesswood Dr., Knoxville, TN 37912, cassette $29.95, disk $32.95, talking version cassette $34.95, disk $37.95, plus $1.50 S/H

Disk Master, a disk utility package incorporating the *Swiss Army Knife* program with several other disk utilities. Included are capabilities to alphabetize directories, convert programs to auto-start, inspect any granule or change any byte. A "disk verify" feature and a 64K boot with Reset protection are also included, as well as output to either screen or printer. Dataman International, 420 Ferguson Ave. N., Hamilton, Ontario, Canada L8L 4Y9, or 125 S. Fifth St., Lewiston, NY 14092, disk $31.95 U.S., $39.95 Can., plus 3 percent S/H ($2.50 min.)

RAMDOS, a utility program requiring at least 16K of RAM that allows the user to store several BASIC programs in the upper portion of memory using it as a virtual disk. BASIC programs are loaded into the lower section of memory in the usual manner, then *RAMDOS* is called from high memory to move the BASIC program in behind itself. A directory can be called of the files currently in the virtual disk area. In a 64K system, only the lower 32K is used. Dataman International, 420 Ferguson Ave. N., Hamilton, Ontario, Canada L8L 4Y9, or 125 S. Fifth St., Lewiston, NY 14092, cassette $25.95 U.S., $29.95 Can., disk $29.95 U.S., $33.95 Can., plus 3 percent S/H ($2.50 min.)

Screen+, an ML screen utility requiring at least 16K of RAM. The program automatically configures itself to the memory resident in the machine and allows loading with an address offset. Featured is a toggle for light characters on a dark background and vice versa, black or colored background selection, and green or orange character selection. Each mode can also be software selected by *PRINT CHR$* commands. Also featured are an automatic line numbering command, a line-by-line *LIST* command, and a text screen dump. The program can be used with the *EDTASM+* editor/assembler. Dataman International, 420 Ferguson Ave. N., Hamilton, Ontario, Canada L8L 4Y9, or 125 S. Fifth St., Lewiston, NY 14092, cassette $16.95 U.S., $19.95 Can., disk $20.95 U.S., $23.95 Can., plus 3 percent S/H ($2.50 min.)

Calorie Counter — Weight Analyzer, a home utility requiring 32K that enables you to find your ideal weight range by inputting height, present weight, sex, frame size, hours spent sleeping, and activity. It will show how many calories are needed to maintain present weight and daily intake is calculated through a menu of 412 foods and multiple servings of each. Printer options are given for monitoring progress. Draco Software, 22 Lassell Street, Portland, ME 04102, cassette $29.95

Full Screen Editor, a utility program with both 16K and 64K versions. The program is invisible to all BASIC programs and includes the following features: automatic line numbering, global search and replace with a wild card function, forward and backward *LIST* function, and a directory feature that will display all files beginning with an input letter. DSL Computer Products Inc., P.O. Box 1176, Dearborn, MI 48121, disk $19.95 plus $2 S/H

High Resolution Picture Puzzle, a puzzle program requiring 32K ECB that will load a graphics picture and then scramble it into 48 blocks. With the arrow keys, you must correctly rearrange the picture within five minutes as timed by the computer. Each time a puzzle is solved, it is scrambled even more and returned. The scores are displayed, and on the disk version, the top 10 are saved to disk. DSL Computer Products Inc., P.O. Box 1176, Dearborn, MI 48121, cassette $9.95, disk $12.95, plus $2 S/H

Super Disk/Tape Utility, a utility program that will transfer programs from tape to disk and from disk to tape. When transferring to disk, if a machine language program has a load address below $0E00, the program will automatically move the program above the disk I/O buffers and append a short relocation routine that will disable the disk ROM and move the program back to its original location when *EXECed*. DSL Computer Products Inc., P.O. Box 1176, Dearborn, MI 48121, cassette $19.95 plus $2 S/H

Super Disk Utility, a program that allows the user to format any track, modify any track or sector, and copy by file or track/sector. The program is menu driven and compatible with multiple drives. DSL Computer Products Inc., P.O. Box 1176, Dearborn, MI 48121, disk $19.95 plus $2 S/H

64K Spooler, an ML printer utility requiring 64K of RAM that stores a printer dump in a buffer and returns the computer to BASIC, therefore freeing the computer for other tasks. The program is compatible with Disk BASIC and transferrable to disk. DSL Computer Products Inc., P.O. Box 1176, Dearborn, MI 48121, cassette $9.95 plus $2 S/H

Crypton, an ML cipher and file reader program that will encrypt files so that they are unreadable to anyone without the proper key-phrase with which to decipher them. The key-phrase of up to 256 characters is selected by the user and entered on the keyboard; the identical key-phrase must be used to decrypt it. First Coast Systems, Box 5396, Jacksonville, FL 32207, disk $24.95

Video Programming Form, a programming form for 32-column formats that aids in formatting video screen printouts and serves as a listing form for program statements and commands. Long text can be right- and left-justified, words hyphenated and the maximum string length delineated. *PRINT @*, *PRINT TAB*, and *PRINT USING* formats can be readily determined. GILENGCO, 2801 Sergeant St., Joplin, MO 64801, six sample sheets $1, 50-sheet pad $6

Graphics Compression Utility (GCU), a disk-based utility program requiring 32K Disk Extended BASIC that compresses binary graphics pictures so that they consume the least possible amount of memory. Then, using the accompanying *Graphics Relocation Utility*, the compressed graphics pictures may be relocated anywhere in RAM. The package also includes the *Graphics Decompression Utility (GDU)*, a position independent machine language subroutine that can be called from BASIC or another machine language program to decompress the graphics from anywhere in memory and relocate them to anywhere in memory (*GDU* runs on any RAM size and non-ECB). LP Seymour Services, 937 Fairwood Ave., Sunnyvale, CA 94089, disk $27.95 plus $3 S/H

Hide-A-BASIC 1.1, an enhanced version of the original ML utility program requiring at least 16K ECB that helps to copy-protect BASIC programs. It will auto-start BASIC programs and disable the BREAK, CLEAR, and Reset keys. The program also will disable various BASIC commands, such as *LIST, LLIST, EDIT, DEL, PEEK, POKE, EXEC, CSAVE(M), CLOAD(M)* and all disk commands and functions. Further, it creates an "ONERR GOTO" routine to trap errors. Since all disk commands are disabled, the program is compatible with cassette formatted programs only. Microcom Software, P.O. Box 214, Fairport, NY 14450, cassette $24.95 plus $1.50 S/H

Chambers, an ML Hi-Res graphics arcade-type game requiring 32K of RAM and at least one joystick. Loosely based on the arcade game *Cosmic Chasm*, the object is to destroy all the evil creatures in each room and then enter the main reactor room and blow up the base. Tom Mix Software, 4285 Bradford N.E., Grand Rapids, MI 49506, cassette $24.95, disk $27.95, plus $2 S/H

Crash, an ML Hi-Res graphics arcade-type game requiring 32K of RAM and at least one joystick. The game consists of four screens which must be navigated by the airplane being piloted by Mario, of *The King* fame. The plane must be flown over and through all of the obstacles without crashing. Tom Mix Software, 4285 Bradford N.E., Grand Rapids, MI 49506, cassette $24.95, disk $27.95, plus $2 S/H

Draconian, an ML Hi-Res graphics arcade-type game requiring 32K of RAM and at least one joystick. In control of a spaceship capable of maneuvering in eight directions, you must destroy each of the enemy bases in order to rescue the astronauts being held captive there. But if you are not quick, the invincible Draconian will appear to teach you the folly of moving too slowly. Tom Mix Software, 4285 Bradford N.E., Grand Rapids, MI 49506, cassette $27.95, disk $30.95, plus $2 S/H

elec*TRON, an ML Hi-Res graphics arcade-type game requiring 16K of RAM and at least one joystick. Composed of four subgames, you must successfully complete each before advancing to the next level. Similar to the popular arcade version. Tom Mix Software, 4285 Bradford N.E., Grand Rapids, MI 49506, cassette $24.95, disk $27.95, plus $2 S/H

Fangman, an ML Hi-Res graphics arcade-type game requiring 16K of RAM and at least one joystick. Based on the Dracula legend, you, as Dracula, chase the invading villagers through the passages of your castle, turning them into vampire bats upon catching them. But the villagers can trap you by placing crosses in your path and the sun, as well, seeks your destruction. Tom Mix Software, 4285 Bradford N.E., Grand Rapids, MI 49506, cassette $24.95, disk $27.95, plus $2 S/H

Ms. Maze, an ML Hi-Res graphics arcade-type game requiring 32K of RAM and at least one joystick. Based on the arcade "Pac" games, this one is random enough that memorizing a series of moves will not assure success — it takes imagination instead. Tom Mix Software, 4285 Bradford N.E., Grand Rapids, MI 49506, cassette $24.95, disk $27.95, plus $2 S/H

The Touchstone, an ML Hi-Res graphics arcade-type game requiring 32K of RAM and at least one joystick. In order to become the favored high priest of Ra, you must enter his temple in search of the touchstone. While inside, Ra will bestow limited use of his powers with which to vanquish your enemies. But, beware! The powers are only temporary and the perils are great. Tom Mix Software, 4285 Bradford N.E., Grand Rapids, MI 49506, cassette $27.95, disk $30.95, plus $2 S/H

Bjork Blocks, a graphics utility requiring 32K ECB and one joystick or mouse. The program features precision drawing and color selection, compressed data storage, and animation (for 64K computers only). Two public domain screen dump programs are supplied for the Radio Shack DMP-115 and 220 printers. Moreton Bay Software, 316 Castillo Street, Santa Barbara, CA 93101, cassette $34.95 plus $2 S/H

LOTTO, a BASIC program requiring 16K of RAM. The program selects six random numbers for use in playing state lotteries and is adaptable to lottery rules in effect in different states. RAM Publications, 1088 Poplar Tree Drive, Annapolis, MD 21401, cassette $5.95

MUSICA II, a music composer program requiring 32K ECB and compatible with all disk ROM versions. The program is the same as the earlier *MUSICA*, but now has a screen print output for the Gemini 10X and Epson printers for making hard copies of the music. All notes are displayed on standard treble and bass staffs and the pitch of each note is controlled by moving the cursor up and down with the arrow keys or joystick. Reitz Computers and Electronics, 3170 W. Central Avenue, Toledo, OH 43606, cassette $34.95, disk $39.95, plus $2 S/H

ROM Runner, a utility program requiring 64K of RAM and a cassette tape drive. The program allows the transfer of ROM cartridge programs to tape, which can then be moved to disk if desired. This cuts down on wear to the disk controller and allows ROM pack programs to be used with a disk system. Sadare Software, P.O. Box 3891, Gaithersburg, MD 20878, cassette $7.95

The Spreadsheet Zapper, a graphing assistance program requiring 32K of RAM. The program takes the spreadsheet data generated by the Radio Shack *Spectaculator* program (either ROM Pak or disk versions) and converts the files for use with the *Bar Zapper*, *Graph Zapper*, and *Pie Zapper* graphing programs. This allows the generation of high resolution graphs and charts from *Spectaculator* files. Southern Software Systems, 485 South Tropical Trail, Suite 109, Merritt Island, FL 32952, cassette $17.95, disk $25.95, plus $1 S/H

Color BASIC Unravelled, Extended BASIC Unravelled and Disk BASIC Unravelled, three individual soft-bound books containing detailed, commented source listings of Color BASIC, Extended Color BASIC and Disk Extended BASIC. The books assume the user is experienced in machine language programming and understands 6809 assembly language. Spectral Associates, 3416 S. 90th, Tacoma, WA 98409, $19.95 each plus $2.50 S/H, $49.95 plus $3.50 S/H for all three

RAM Checker, a ROM pack diagnostic utility that requires at least 16K of RAM. The program checks all memory locations in RAM, displays the page number and location being checked, and halts execution when a bad location is encountered. The address information can then be used to determine which chip is not good. Spectrum Projects, P.O. Box 21272, Woodhaven, NY 11421, or P.O. Box 9866, San Jose, CA 95157-0866, ROM pack $24.95 plus $3 S/H

Happy Birthday, Mr. Gift, an educational vowel discrimination drill program requiring 16K of RAM. The program is designed for initial reading instruction (kindergarten through the second grade). Children unwrap presents and unlock words, discriminating between pairs of one-syllable words with different vowels. Featured are spoken messages, graphics, timed levels, music and a scoring machine. TEKSYM Corporation, 14504 County Rd. 15, Minneapolis, MN 55441, cassette $14.95 plus $2 S/H

The *Seal of Certification* program is open to all manufacturers of products for the TRS-80 Color Computer, the TDP-100, or the Dragon-32, regardless of whether they advertise in THE RAINBOW. By awarding a *Seal*, the magazine certifies the program *does exist*, but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW's reviewers for evaluation.

— Kevin Nickols

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REVIEWING REVIEWS

MORSE CODE TEACHER AND MORSE CODE TUTOR

Editor:

We wish to express our appreciation to THE RAINBOW for reviewing our programs, *Morse Code Teacher* and *Morse Code Tutor,* in the June 1984 issue. As noted by your reviewer, these programs from our Amateur Radio Series are intended primarily to help prepare for the Federal Communications Commission code exams which are required to obtain or upgrade a ham license. In addition, they would be helpful to a Scout trying to earn a merit badge in international Morse code. There are several points, however, which we feel do require clarification.

In *Morse Code Tutor,* the three V's that the program sends at the beginning of each one-to-five minute practice session *are* the "ready" signal; no additional auditory prompt follows. Instead, immediately after the three V's come the characters to be copied on paper and then checked against the characters that appear on the screen at the end of the session.

A more serious inaccuracy is Mr. Graham's statement that the characters in each practice session are sent in groups of five at a time. While Morse code *can* be sent in groups of five characters, this is usually practiced only with enciphered messages, such as the cryptogrammatical codes used by the military during wartime. In the random-practice sections of both *Morse Code Teacher* and *Morse Code Tutor,* characters are sent individually and continuously, one after another, with equal spacing between. I suspect that Mr. Graham's confusion stems partly from the fact that when the characters appear on the screen for checking, they are arranged in five-character groups, which is much easier to read than a screen full of continuous, uniformly spaced characters.

Cynwyn's Amateur Radio Series, which includes both code and applications programs, are written by hams, for hams — and we feel that it is a disservice to your readers to present reviews of this type of software by someone who admittedly has no understanding or appreciation of the subject matter.

Both *Teacher* and *Tutor* require 16K ECB. Disk versions will be available in the near future. *Morse Code Teacher* is also available for the MC-10 with 4K RAM.

Cyndi Rannels KA3LLX
Cynwyn

SUBTRACTION DRILL

Editor:

As author of *Subtraction Drill,* I wish to respond to Mr. Stephan Brown's review in the September 1984 RAINBOW. I feel Mr. Brown's review is incomplete in that he tells nothing about the meat of the program. He vaguely states that it offers a "varied selection of subtraction problems." Nowhere does he state that it is an all-inclusive program with 13 levels of instruction. These levels were outlined by primary school teachers to correlate with the Knox County Schools Math Curriculum.

The beginning levels include sequential and random facts; whereas the more advanced levels include borrowing a 10, borrowing a 100, and borrowing both 10s and 100s with a tutor for help which Mr. Brown failed to mention.

Mr. Brown's suggestion that a laminated copy of the "Control Key" page be provided is unwarranted. Both the documentation and the program clearly indicate that, at any time, the student may press the 'K' key for a display of the control keys. I consider that to be a superior feature to any plastic card which normally tends to get misplaced, especially in a public school.

Mr. Brown spends a great deal of time in the review criticizing the graphics and reward routines. He states that the graphics "reward" is done in non-Extended BASIC which is incorrect. He also states that the music melodies are "uninspiring." Since when, Mr. Brown, are patriotic songs such as the *Star Spangled Banner* and *America* "uninspiring and worn out?"

Mr. Brown, you totally missed the boat in your review when the major portion of your review dwells on graphics and rewards rather than the program as an educational tool.

I can understand why your fourth grade daughter became bored with the program as she has evidently mastered all subtraction skills. The documentation states that the program is for preschool through the fifth grade. Most elementary school educators would understand that subtraction skills will be mastered by the end of the third grade. Above that level, the program would normally be used for remediation. I also imagine that no parent of a fourth or fifth grader would order the program unless the child was needing special help.

Like the reviewer, I also have questioned the slowness of the clearing of the screen at particular times during the program. Perhaps most adults and children who have mastered these skills would find this process tedious. During extensive field testing, the slow screen has not been an issue. In writing programs which deal with mastering skills, we must remember to look through the eyes of the learner and not through the eyes of the proficient.

CY-BURNET-ICS is committed to the production of superior educational software. We welcome constructive criticism and specific suggestions for revisions and improvements to any program.

Ben Burnette
CY-BURNET-ICS

T.UTIL

Editor:

We would like to thank A. Buddy Hogan for his fine review of *T.UTIL* that appeared on Page 269 of the June 1984 issue. Praise such as, "I haven't seen any tape utility that can compare to *T.UTIL*" is certainly gratifying to us. We hope to use the phrase he coined, "Tape Tamer," in our future advertising.

The article does need clarification in two small points. Mr. Hogan's discussion of the APPEND command is correct but may leave the impression that this command is only for appending BASIC program files. APPEND can be used on data files and machine language files. In fact, the graphics screen at the beginning of *T.UTIL* was attached to the main program with APPEND. The restrictions that a file be in ASCII and in line number sequence only apply to BASIC program files.

The other point of clarification is between *EXEC&H65H* and *EXEC.* After the program has been terminated by the use of the EXIT command, it may be rerun with *EXEC.* If the program has been terminated by pressing the Reset button, *EXEC&H65B* will return you to the command prompt. These were reversed in the article.

Once again, we would like to thank Mr. Hogan for his fair treatment of a new product in the CoCo marketplace.

Craig Hunt
Sadare Software

Color Disk *EDTASM* — A High Quality Programming Tool

By Roger Schrag

Radio Shack has been making their *EDTASM* editor/assembler program for the Color Computer for several years now. An editor/assembler is a programming tool that lets you write programs in assembly language for the Color Computer. Until very recently, *EDTASM* was only available as a Program Pak ROM cartridge. This left users with disk drives out in the cold.

Now there is *Color Disk EDTASM*, a disk version of the popular editor/assembler package. The package consists of a large three-ring binder which contains the manual and one diskette.

Although the manual is quite large, over 120 pages, it makes no attempt to *teach* assembly language to the beginner. The manual will only teach you *how to use* the *Color Disk EDTASM* package. However, the manual does give some recommendations of additional books to help out those new to assembly language.

This manual is very similar to the manual provided with Radio Shack's *EDTASM* Program Pak. Of course, new sections have been added to explain the new additional features of the disk version. Also, some omissions and inaccuracies in the original manual have been corrected. The manual contains reference sections which are excellent for experienced assembly language programmers who need to check something here or there. However, this setup makes the purchase of an additional text almost mandatory for the computerist who is new to assembly language programming.

Color Disk EDTASM requires a 16K Color Computer with at least one disk drive. Although a second disk drive really isn't necessary, 32K of memory is very strongly recommended. You won't be able to do very much serious programming on a 16K system. I will come back to this later.

The diskette supplied in the package contains five programs. *DOS/BAS* and *DOS/BIN* contain a miniature disk operating system. *Color Disk EDTASM* uses this mini-DOS to load and save your programs on diskette. Therefore, it is necessary for you to load in the mini-DOS before you can use *Color Disk EDTASM*. The manual provides a great deal of technical information about this mini-DOS so that you may write programs of your own which use this mini-DOS for loading and saving data on diskette.

When you turn on your computer and type in *RUN"DOS"* the mini-DOS initializes itself. A title screen appears, along with a menu of functions you may perform from the mini-DOS. You may load a machine language program, do a disk directory, see how much space is free on a diskette, copy a file from one diskette to another, or turn on an on-screen clock display.

As you might notice, most of these functions can be performed from BASIC very easily. For example, it is a lot easier to type in *COPY "FILE1" TO "FILE2"* from BASIC than it is to type *RUN"DOS"*, wait 10 seconds for the mini-DOS to initialize, select menu option five, wait another five seconds as the file copier gets ready, and answer seven questions about the file to be copied.

To use *Color Disk EDTASM*, you put the program diskette in drive zero and type *RUN"DOS"*. When you get the menu, you select option two, load and execute a machine language program. Now you type in *EDTASM* and press ENTER. *Color Disk EDTASM* now loads in and executes automatically.

Color Disk EDTASM's editor is almost identical to that of the original *EDTASM* Program Pak. You can insert new lines, delete old lines, renumber, copy lines to another part of the program, print lines up on the screen or printer, or edit lines in a fashion similar to the *EDIT* command of Extended Color BASIC.

Of course, you may also load and save your source code. A major feature of *Color Disk EDTASM* is that you may load or save on diskette *or tape*. So, if you have an old project that you started before you got your disk drive, you may load your code from tape, edit it a little, and then save it to diskette.

There are a few areas in which *Color Disk EDTASM* has been greatly enhanced. One of these areas is that of printing up listings on a printer. A new *S* command lets you set how many lines your printer puts on a page, and how many characters on a line. *Color Disk EDTASM* will then format all printouts so that there will be a blank area at the top and bottom of each page of printout. This avoids printing on the perforations when using fanfold paper, a great convenience. Also, printouts done when assembling a program have an optional title printed at the top of each page, along with a page number.

The assembler itself has been enhanced to allow macros, an INCLUDE command, and conditional assembly. Macros and conditional assembly are simply convenience features that many programmers can live without. The INCLUDE command, however, may be a necessity if you plan to write extremely long programs. The INCLUDE command lets you break your long program into several shorter ones, all contained on the same diskette. The assembler then reads in all of the smaller parts and reconnects them into one large program.

Color Disk EDTASM also comes with *ZBUG*. This is a little debugger that lets you run your assembly language program step by step and continuously monitor its operation and use of memory and CPU registers. This is an excellent aid for finding bugs in your programs (unless, of course, your programs never ever have bugs).

Color Disk EDTASM is a lot like the original Program Pak version of *EDTASM* except that bugs in the original have been corrected, and some great new features have been added. But you pay a price for such a feature-packed programming tool. *Color Disk EDTASM* takes up lots of your computer's memory. It takes up so much space that the standard version won't even fit on a 16K Color Computer.

A special version of *Color Disk EDTASM* is provided for 16K users. (This rounds out the five programs on the included diskette.) This special version conserves memory by only having part of the program in memory at any one moment. This means that there always has to be a diskette in drive zero containing the special version of *Color Disk EDTASM*. Occasionally, the computer will pause for a few seconds as it accesses part of this program on drive zero. The setup is very reasonable; the pauses are very smooth and not disturbing. However, this special method of conserving memory still only leaves the 16K user about 2200 bytes for

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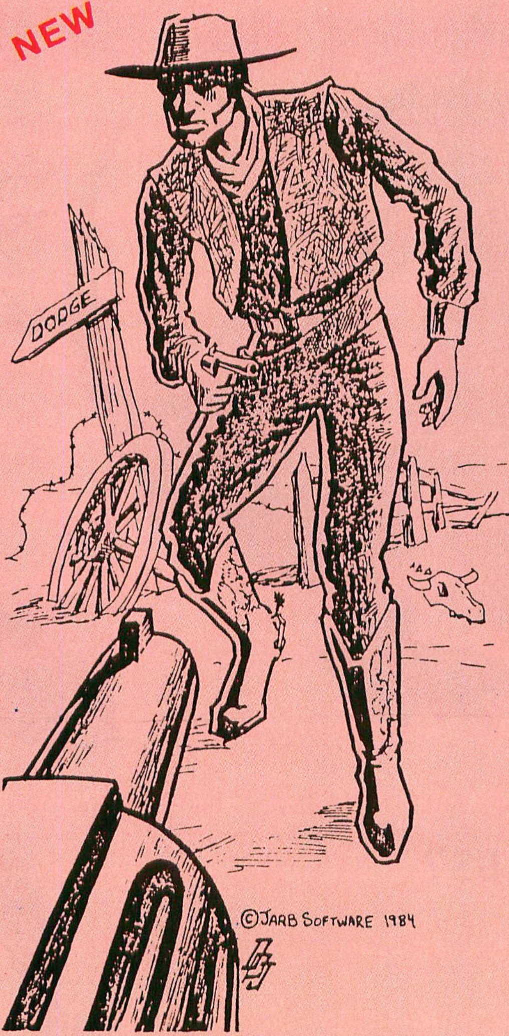

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his program. This is why I say that a 32K system is really needed for any serious programming applications.

The *DOS/BAS* and *DOS/BIN* programs may be used directly by any programs you write in order to make loading and saving of data files on diskette very easy. A large part of the manual explains how to use routines in the DOS program. In fact, there is a complete, commented source code listing of the entire *DOS/BIN* program included. That's over 25 pages front and back of source code! Actually, looking at parts of this listing may offer examples of programming style and technique for those new to assembly language. But be careful because Radio Shack wrote the *DOS/BIN* program on a more sophisticated system than *Color Disk EDTASM*, so there are some special commands in the listing that *Color Disk EDTASM* does not recognize. This may cause some confusion.

Unfortunately, the fact that the *DOS/BIN* program is copyrighted causes some problems. For example, if you would like to write a program that you intend to market commercially, your program should not use the *DOS/BIN* program. If it does, then nobody will be able to use your program unless they own a copy of Radio Shack's *Color Disk EDTASM*. This cuts your potential market size down considerably. So the only time that the technical information presented in the manual will really come into use is when you plan to write a program requiring disk I/O for your personal use.

Color Disk EDTASM doesn't seem to have any real bugs. That is to say, I couldn't find any situations in which the assembler would destroy your program or the mini-DOS would render a diskette unusable. (Incidentally, a very obscure bug in the original *EDTASM* Program Pak pertaining to the error message MULTIPLY DEFINED SYMBOL has been fixed.) However, the *DOS/BIN* program is very poorly written in some respects. For example, if you try to load a source code file from a diskette with a write-protect tab on it, your disk drive will go wacko for a few seconds and then the error message DISK WRITE PROTECTED will appear on the screen. This is an unnecessary irritation to many programmers like myself who like to write-protect their diskettes to prevent accidental erasure.

Also, the mini-DOS performs most disk operations much more slowly than necessary. Another disk editor/assembler program on the market, for example, will load and save source code files in under 65 percent of the time it takes *Color Disk EDTASM*.

If this review seems long to you, consider that an editor/assembler is a very complex programming tool. Radio Shack's original *EDTASM* Program Pak was probably the first such program on the market for the Color Computer. But when it comes to purchasing an editor/assembler which works with disk drives today, you have quite a choice. It might pay to examine the alternatives carefully before you buy.

Although the Radio Shack offering is quite good, there are a few features I would like to see added. The *DOS/BIN* program needs some cleaning up. The assembler doesn't allow multiple *FCB* statements on one line, nor does it allow binary constants. Also, if you forget a file's name or don't know which diskette has enough space on it, there is no way to see a diskette directory while in *EDTASM* without losing your program.

Another feature that would be nice is support for Color Computers with 64K. By using all of the memory in a 64K Color Computer, you would be able to write longer programs without having to break them up and use the INCLUDE command.

I have a final wish on my list: Radio Shack should put the *DOS/BIN* program in the public domain so that everyone could have a copy and software vendors could use it in their programs. Then there would be no more incompatibility problems with disk-based software not working on the Color Computer 2, and so on. Vendors would no longer have to market separate versions of their software for the Color Computer and Color Computer 2. Also, users wouldn't have to worry about buying a program and finding that it doesn't work on their machine.

In short, *Color Disk EDTASM* is a high quality programming tool that will help you write programs in assembly language for your Color Computer. The manual in a very clear and friendly manner helps you learn how to use this programming tool, but does nothing to teach you assembly language. You will need to get a separate text to read if assembly language is new to you. Although *Color Disk EDTASM* has some irritating shortcomings, it also sports some very sophisticated features as well.

If you have specific questions, please write to me at 2054 Manning Avenue, Los Angeles, CA, 90025. Please include a self-addressed, stamped envelope.

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Learning how to type can certainly be boring. Improving your typing skills can be worse, because there is no better way to improve skills than by continuous practice. *Type Trek*, by CoCo Chips, takes an otherwise dull activity and changes it into fun.

Type Trek is actually three games in one, each game providing drills to improve typing skills. There is a letter game, a word game and a sentence game, all providing an outer space scenario.

The program requires at least 16K Extended BASIC and 16K users will have to *POKE25,6:NEW* before *CLOADing*. After *RUNning* the program, the user is asked to input the number of players (one or two), the players' names and rank. The rank is the skill level depending on which keys you want to work on. For example, Level 1, Cadet, works on keys ASDF and each additional level adds more keys. The user can begin in any level and work his way up through the ranks. The program does not deal with numbers and most special characters because, according to the author, these keys may vary in placement from keyboard to keyboard. A cumulative score is kept as well as a percentage of accuracy. In order to go on to the next level, an accuracy rating of 95 percent is needed. The typing is not timed, but bonus points are added for fast typing.

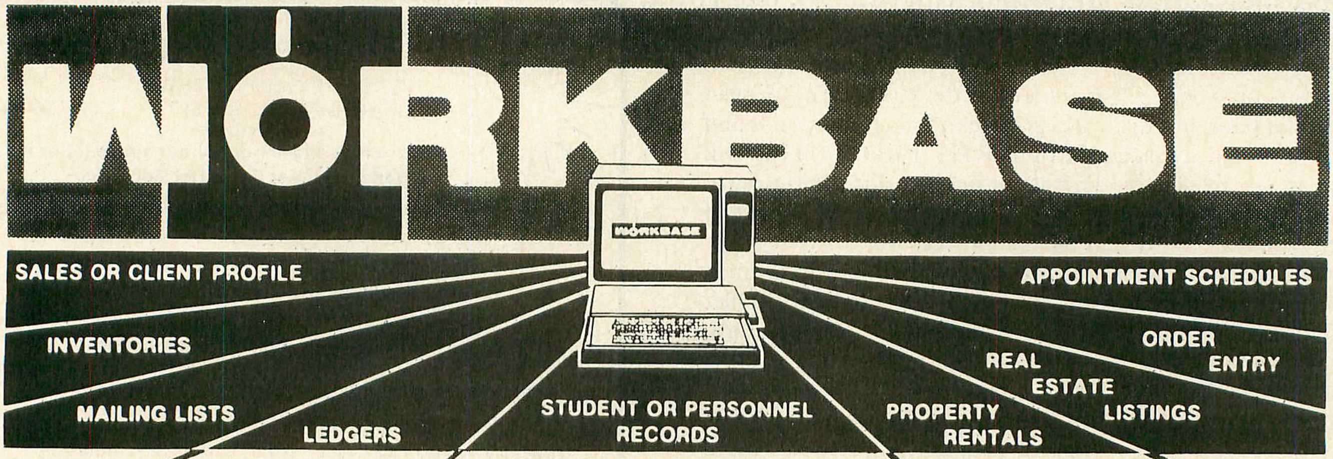
Type Trek is a low resolution graphics game. The characters and symbols used are neat, clear and fun to watch. During the word game, letters appear and the user must type the letters after they disappear from the screen. In the word game, a word appears and you must copy it accurately. The sentence game has a sentence shown on the screen, and again the user must copy it. Each game makes up a wave and the user is given the choice of having the game be three, six or nine waves long.

The documentation is well written and very complete. It is easy to follow and tries to anticipate every situation that could possibly arise. The booklet is written in such a way as not to be overwhelming in its technical explanations. Anyone should be able to understand the documentation and enjoy using the program. The documentation even includes a rather large section on learning how to type. If the user finds that a 95 percent accuracy rate is too high (or too low), easy to follow instructions are given for changing this.

This tutorial could easily be used in the schools and at home. It's written to appeal more to children than adults, but I see no reason for adults not to have fun also. Knowing how to type well does not seem to be important to most children, but as they progress in their education, they will discover what a necessary skill typing is. *Type Trek* can help you and your children better your typing ability in a painless and fun way.

(CoCo Chips, 92 Acorn Circle, Oxford, OH 45056, tape $19.95, disk $22.95)

— Stephanie Snyder



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Colormind: A Nice Adaptation, But . . .

Colormind, by Aurora Computing, is another computer adaptation of the popular board game "Mastermind." The idea of the game is to correctly solve the computer-generated code of four colors within 10 guesses. Upon choosing your guess from a choice of six colors, the computer will print 'A's and 'B's. An 'A' signifies the color is correct in the right place while a 'B' indicates a correct color but in the wrong place. If you guess the correct code within the 10 tries the computer prints a congratulatory message, but, if you fail, the computer will reveal the correct code. This is all done in low resolution graphics with a few beeps here and there for sound.

An interesting feature of *Colormind* is the method of giving the player instructions. The computer asks if you wish to have instructions. If you reply "yes," it gives you the complete rules in an attractive format and even shows an example of game play. The brief documentation, therefore, is more than adequate as all the information needed is included in the program. *Colormind*'s program length is only about 4.5K, a good portion of which is used for the instructions.

There are a few quirks which irritated me about *Colormind*. One, if a person accidentally enters a non-acceptable value (a number greater than six or a letter of the alphabet), the computer prints a question mark and a turn is wasted. Also, the instructions included as documentation say that two people can play, but unless they alternate playing games, I don't know how they would do it. Neither the instructions nor the written documentation supply this information.

If you hate typing in program listings and don't mind paying $10.95 for a program that is similar to those found in Color Computer magazines, *Colormind* is worth your money as it is a good adaptation of "Mastermind."

(Aurora Computing, 49 Brookland Ave., Aurora, Ontario, L4G 2H6, $10.95 on tape)

— Ken Coleman

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Cassette Database Made Easy With *File Cabinet*

File Cabinet is a database program written for the 16K ECB Color Computer. It is a neat little program that will allow you to perform some of the simple functions normally associated with database programs. That is, it will let you input, locate, modify, delete and sort data. You can also save/load data to/from tape and print records on the screen or your printer. The program is very user-friendly. It comes with three sheets of documentation and is written quite well in a logical order. You really don't need any more documentation because the program is simple to use by just following the on-screen prompts. The software automatically adjusts to the amount of memory of your machine. With a 16K CoCo you can operate with up to 50 records in memory and with 32K you can have up to 200 records. This assumes that you average around 100 characters per record. If you will need more characters per record (up to 250), then this will reduce the number of records you can have.

File Cabinet is error-trapped quite well, but if you do crash the program by hitting the BREAK key, etc., you will not lose the data you have entered. Simple instructions are given on how to recover. If for some reason you run out of string space (when inputting data from the keyboard or appending from tape), further inputting is stopped but the data is not lost. This is particularly useful when appending data from tape to a file residing in memory.

One complaint I have is that only one copy of the *File Cabinet* exists on the tape. I think any program sold on tape should have a backup included. There are instructions on how to make your own backup, but since you lose some of the features of this program when you make the copy, your backup isn't a real backup. Owls Nest will provide you another copy to use as a backup for $5. I found that the backup copy I made would not work properly with my disk drive hooked up to the computer although the original copy worked fine. This shouldn't be a problem though, because I would not recommend this program for anyone with a disk system. Now I will describe each of the functions available with *File Cabinet*.

INPUT DATA — When you initially set up a file you are asked to input the names of each field that you desire (up to five). Once you have defined these fields you are then prompted to start entering data. As you finish entering data for each record you are given three choices: continue on to the next record, modify the current record, or return to the main menu. Modifying the data is quite easy as you are presented each field for the record and asked if you want to change it or not. If you do, then just type in the correct data and the change is made.

LOCATE DATA — This is a handy feature that will allow you to search a field for data. After selecting the field you want to search, just type in the string you want to search for and, when it is found, the entire record will be presented on the screen. You can then continue the search or return to the main menu.

MODIFY DATA — Modifying data is easy. All you have to do is enter the record number and each field of the record will be presented to you. You can then modify all the fields or just a single field.

DELETE DATA — In this mode you can either delete all data or single records. In either case you are given ample warning of what you are about to do and have to verify your instruction before the deletion actually takes place.

SORT DATA — You may sort on any or all of the first three fields. This is where the program really shines. The sort is a machine language sort that is really fast. I entered a 200 record file that consisted of articles, program listings, and reviews from the RAINBOW. I then had the program sort on three fields. The sort took a little longer than the documentation said it would, but who's going to complain about 27 seconds? When I sorted the same 200 records on a single field it only took 3.7 seconds.

SAVE ON TAPE — Once you decide to save your data to tape the software will automatically make two copies. In addition to this you are given the option of verifying that the first save is a good one by rewinding the tape and pressing ENTER and Play. As I said earlier, this program is very user-friendly and you really have a lot of features to make sure you don't lose several hours worth of work.

LOAD FROM TAPE — This option is used to load data from tape. The nicest part of this option is the ability to append a tape file to one residing in memory.

SHOW ON SCREEN — With this option the records will be displayed on the screen one at a time. You can select any of five scanning speeds. You can either look at all records or single records. The only way to look at a series of records in a certain category would be to sort on that field first. This would group like records together. You could then have all records displayed on the screen one at a time. The records you are looking for would then eventually appear in sequence. You have the option of printing these records on your printer if you desire.

SEND TO PRINTER — In this mode you can print individual records or all records on your printer. If you want to print them individually you must know the record number you want printed. There is a lot of paper wasted when you print records, but considering the memory limitations and the very reasonable price of this program, that is something you will have to live with.

I recommend *File Cabinet* for anyone wanting to get started in using databases with a cassette recorder. If you plan to move up to a disk system in the near future then I would not recommend it. You are limited in what you can do with *File Cabinet*, not because of the program itself, but the limitations a cassette-based system places on you.

(Owls Nest Software, P.O. Box 579, Ooltewah, TN 37363, cassette $19.95 postpaid)

Michael Hunt

Stands Monitor Useful To Some

A lot of people (myself included) think that the best place to put a computer's monitor is on top of the computer. With the CoCo this is not a good idea, because the computer's top is rather small and the plastic case just won't support a heavy item. As with any design flaw (real or imagined) in a popular computer, there have been a number of attempts to cure the problem. Howard Medical's TV stands are designed to hold a TV or monitor above the CoCo so that the set's weight doesn't rest on the computer; this goal is met, but there are other problems.

The Howard Medical stands are made from ½-inch plastic sheet (either Plexiglas or Lexan—I don't know which) bent to fit over the CoCo. A series of holes are drilled in the stand near the sides of the computer to provide ventilation, and a slot is cut in the right side for ROM packs or other cartridges. The 13-inch model (really for anything up to the new 14-inch sets) fits over the CoCo and has the same width on the inside as the CoCo's case; the 19-inch model (for sets from 15-inch to the new 20-inch) has space for a cassette recorder to the left of the computer. Each model is available in either a smoke gray (transparent) or ivory color (opaque).

A possible problem with the stand is that it is somewhat flexible; if the TV or monitor is very heavy, part of the weight may rest on the CoCo. This is more likely to be a problem with the 19-inch version, since it is nine inches wider and the larger flat surface is less rigid. We tried the stands with three color TV sets, a 10-inch, a 13-inch and a 19-inch; while the 13-inch version held up well, the 19-inch version bent to some degree under the load. (My tests were done with solid-state sets; an old tube TV would be much heavier, and I doubt that either stand could support one.)

The stands' other problem is their depth. Both stands are 11-inches deep, and since the front of the stand is behind the keyboard, the stand extends for about six inches behind the computer. This makes it very difficult to reach the power and Reset buttons from the front of the computer.

Howard Medical has a good idea here, but its execution is somewhat awkward.

(Howard Medical, Box 2, Chicago, IL 60690; 13-inch version $29.50, 19-inch version $39.50, specify for regular CoCo or CoCo 2)

— Ed Ellers

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CoCo Plotted Coordinates Courtesy of *Graph It*

Tired of getting out your pad of graph paper to plot out your equations? Why not let your Color Computer handle the chores involved with plotting your coordinates? *Graph It* does a nice job of doing just that and with a minimum of fuss and muss (and no graph paper!).

The program, in Hi-Res, graphs a set of equations in the form of *Y=Function(X)* onto X-Y axes. You can graph as many equations as you want on the same set of axes.

The program has instructions, if necessary, and gives examples of the following math functions: division, sine, absolute value, square root, natural logarithm. Sample equations are given, such as:

```
Y = X ^ 2 + .5 * X - 10
and
Y = 1 - COS(X)
```

Individual points (as pixels) can be plotted up to 10. Pairs of coordinates are entered as "X,Y."

You are then prompted "How many equations do you want graphed?" I entered several different combinations to try out the program. You must enter the lower and upper limits for X and Y. Minimums are given by the program.

The first time around, the program displayed the graph, immediately cleared and printed that my equation was not in the proper form and that I had to redo it. I corrected the error and the graph came up with X,Y axes marked according to specifications. You also have the option of marking special locations to determine if your equations will fit within these special delimiters.

The program does a nice job of what it is designed to do and I feel it is worth the price.

(Computer Island, Dept. R, 227 Hampton Green, Staten Island, NY 10312, 16K-EXT, $14.95)

— Michael F. Garozzo

Watch Your 'Copters In *Whirlybird Run*

Whirlybird Run by Spectral Associates is a good attempt at making a home version of Scramble. You begin the game with four helicopters. The helicopters can be lost by crashing into enemy ships, the ground, or running out of fuel. Refueling can be accomplished by destroying the enemy craft with an 'F' on them. It isn't as easy as it seems to dodge the ground, since mountains constantly pop up in front of your 'copter. In the first screen, the only flying hazard is the enemy missiles. The second screen adds the bouncing saucers, and later screens, the arrows must be avoided. Shooting at these arrows does no good since they are indestructible. Finally, you enter the "Cavern of Doom." About this obstacle I can't say much, because the only time I got there I lost my one remaining 'copter before I could get very far.

The helicopters are very well drawn, especially the rotating blades. The sound effects in the game are good, particularly the sound of the helicopters. The other graphics, such as the mountains, are well drawn. *Whirlybird Run* is more than sufficiently challenging. The animation is smooth.

In my opinion, the game could stand some improvements, like adding the sounds of explosions, saucers, and rockets, for example. A more serious problem is the inability to pause the game; it just keeps on running. Finally, the green sky is not up to par with most of today's CoCo software.

As a point of interest to those of us with shaky drives and/or tape recorders, this is a copy-protected game. Copies which fail to load will be replaced by Spectral Associates for reasonable prices. Finally, *Whirlybird Run* is a good game, but it is just not all it could be.

(Spectral Associates, 3416 South 90th Street, Tacoma, WA 98409, tape $24.95, disk $28.95)

— Joe O'Connor

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DO-FILE/FIX-FILE — A Good Memory Database

By Frank J. Esser

There are a number of database programs out for the Color Computer. Most of them are disk oriented and a few are designed to function on cassette based systems. *DO-FILE* is a database that is unique in that it is a third form, a memory database. Since it is a memory database, the amount of data that can be stored at any one time is limited. The manual states that the maximum storage is 16,480 characters. How this translates into records is dependent upon the size of each record. If, for instance, a record is 55 bytes long, then the database will hold a maximum of 299 records. Although the manual does not state it as such, I doubt that the *DO-FILE* will run on a 16K Color Computer. *DO-FILE* has the ability to load and save files to disk or cassette. However, upon initialization you are asked if disk or cassette is being used. If you load a file from cassette, all files must be saved to cassette also. If you desire, the variable used to indicate if cassette or disk is being used can be changed at midstream and the file saved to disk. I tried it and it works well.

DO-FILE comes on a cassette along with its companion program *FIX-FILE*. Also included is a 32-page instruction manual. The manual is well-written and quite easy to follow. It is broken down into three distinct sections. The first is the introduction section. It is here that the author gives a brief overview of what to expect from *DO-FILE*. Also, the memory restrictions are listed and explained. Next the program loading instructions are given. To get maximum memory, a few pokes are required to set the computer up. Once this is done *DO-FILE* can be loaded and run. The program initialization takes you through a series of steps, required to match *DO-FILE* for your particular set-up. These steps are:

1) Printer Speed
   Set your printer Baud rate to 300, 600, 1200, 2400 or 4800.
2) Printer line width
   Adjustable from 0 to 132
3) Header/Footer spaces
   Number of blank lines to leave at top and bottom of each page
4) High Speed
   Will set your clock speed to high if so desired
5) Input/Output Device
   Cassette or disk used for input/output device

After all these prompts are answered, the main menu appears. It is here that I feel one of the program's shortcomings shows up. The main menu is a complete screen full of data that is in a very cramped style. It is hard to read and the cramped style does not help. The main menu presents 12 options or commands. Here is an explanation of each.

NEW is the command used to create a new database. Through this command you can define your file contents in terms of fields each record will contain and its length.

The *CREATE/CHANGE* allows you to add data to the database or change data already in the database. If you wish *DO-FILE* to find the first open record for you, all you have to do is enter a + in response to RECORD NO — a very nice feature. If you wish to change a record, all you have to do is enter the number of the record you wish to change.

The *RECORD* command will display any record for you on the screen. If the requested record does not exist you are so informed.

The *DELETE* command does just that. It will delete records for you from the database. You are asked for the number of the record to delete. If that record does not exist, you are so informed. If the record does exist, you are asked again if you want to delete this record. Sort of a secondary check, like "ARE YOU SURE(Y/N)?"

The *LIST* command will dump the database to either the screen or printer. Using the Space Bar, the printing of data can be halted. Once the listing is halted it can be either continued or aborted. If the printer is not on-line, you are requested to either put it on-line or abort the print process.

The *MAINTENANCE* command lets you load and save files. If you specified, during initialization, that you would be loading from cassette, then all saves and loads will be attempted from the cassette recorder. The same is true if you specified a disk as the input/output device. If you attempt to load a file while one is already in memory, a message will be displayed warning you that a file is already in memory and must be saved or *DO-FILE* must be rerun before the desired file can be loaded. You have the option, during file save, to save the file in its normal order or its sorted order.

The *SORT* command allows you to sort the file on any of the fields. As a matter of fact, you can sort on any three fields selectively. That is, you have the ability to sort on the first field, than sort within that field limits based on the second field and on to the third field. The sorts can be either ascending or descending.

The *ORDERED/LIST* command will display or print the results of a *SORT* command. When the records within the file are sorted their order is not changed. What happens is, an index is built that lists the present record numbers in their sorted order. Thus, all *ORDERED/LIST* has to do is read this index and display the records in the indicated order.

The *TOTAL* command lets you specify a column of numbers to be added up. The numbers to be totaled need not be right justified in the field that is to be totaled, they just have to be within the field boundaries.

The *FIND* command will permit a string search of up to three fields. The search function will perform match that is independent of the string location within the field or fields being searched.

The *HELP* command will display the command menu and return you to where you came from upon pressing any key.

The *EXIT* command terminates the *DO-FILE* program and returns you to the BASIC interpreter.

Also included is a utility program called *FIX-FILE*. *FIX-FILE* gives you the ability to either enlarge any of the previously defined fields or to add a new field. *FIX-FILE* thus gives you the ability to modify the structure of the database file without having to dump and reload it after the modifications have been made.

DO-FILE performs all the functions it is documented to have and performs exactly as described in the documentation. *DO-FILE* is a memory database and for that reason is limited in the amount of data that can be stored in any one database. However, if the number of bytes you would want to store does not exceed 16.5k bytes, then *DO-FILE* should work for you. For example, I built a test file with the following fields defined. The file was to hold my Christmas card list. The fields are defined as follows:

Name	30 bytes
Address	30 bytes
City	25 bytes
State	2 bytes
Zip	5 bytes
Phone	12 bytes
Total	104 bytes

With each record being 104 bytes long, I would be able to store 158 different names and addresses in *DO-FILE*, which is more than enough for this application. The sort routine is fairly fast and appears to be a Shell-Metzner sort routine. A real plus for *DO-FILE* is that its print and display routines can be interrupted and stopped without exiting the program. Also, during the running of the sort routine, periods are periodically written to the screen indicating that indeed something is going on. I think the main menu is too cramped and hard to read, but it is functional. You are asked to insert either a cassette or diskette, depending upon whether you specified disk or cassette as the I/O device. You are then asked for the filename.

I think the first prompt and required reply is unnecessary as I feel it is safe to assume that if you are about to read or write a file that the appropriate media be in place before the I/O operation is started. The place for these types of prompts is where I/O operations are not dependent upon responses from the keyboard.

In summary, *DO-FILE* does everything it is documented to do and does provide all the functions necessary to setup and maintain a small memory resident database. Also included is a utility program, which allows the user to enlarge and add fields to an existing database without dumping the file to a hard copy device and then re-entering the data after the file parameters have been redefined. A sample file is included which is used throughout the manual as the basis for the various commands examples. I received an updated version which corrected the errors in the original version. However, I still had a syntax error on Line 182. I corrected that problem by listing Line 182 and re-entering it. I then saved the file and the syntax error went away. I could not find anything wrong with the original line as entered.

I like *DO-FILE*. It has its limitations, but as long as they are understood, I think has its merits. Error checking is performed to such a degree that I could not crash the program during a run while staying within reasonable bounds.

(Solid Software, P.O. Box 712, Levittown, PA 19058, $29.95 plus $2 S/H)

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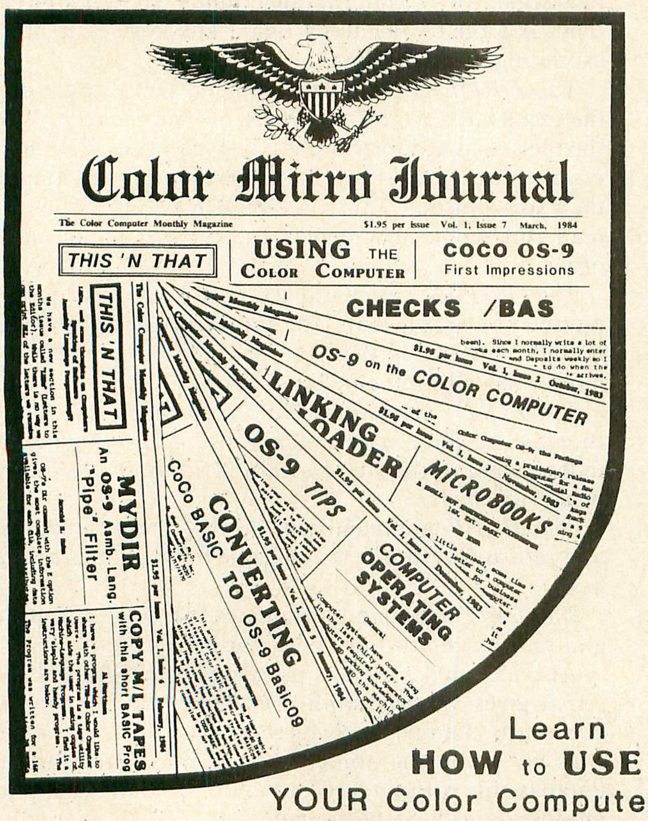
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Super Bug — A Powerful Debugger

Super Bug is a powerful machine language monitor for the Color Computer. Monitor programs aid you in debugging and modifying machine language programs. They allow you to examine and modify memory and registers, as well as execute programs step by step. *Super Bug* is not as powerful as the ZBUG monitor built into Radio Shack's *EDTASM+*, but it is more flexible.

Super Bug offers most of the needed features of a machine language monitor. It displays Hex or ASCII codes of data in memory. The display is well formatted for screen or printed output. The program also shows the internal registers of the microprocessor. Both memory and registers can be modified to contain new values. *Super Bug* will work with a 64K system, automatically switching over to 64K mode and copying the BASIC ROMs to RAM.

The program operates from two main menus accessed by the CLEAR and BREAK keys. A third sub-menu enables many of the displays to be printed. Besides displaying and modifying memory, you can search, compare, and duplicate blocks of memory. You can jump to subroutines and set breakpoints to halt execution at specific points. This allows you to step through a program and examine the results of each section.

Super Bug contains a mini-disassembler, which breaks Hex codes into blocks that represent machine instructions. The 6809 microprocessor in the Color Computer has instructions from one to four bytes in length. The mini-disassembler separates these codes into correctly spaced blocks to facilitate looking up the mnemonics in a book or programmer's reference card.

The program can load or save machine language programs using cassette tape. However, it does not provide the same functions with disk. You will have to exit to BASIC and use the *LOADM* and *SAVEM* commands. This is a small inconvenience, but it does mean switching back and forth between *Super Bug* and BASIC for the disk user.

The 22-page manual begins with a command summary. A detailed description of each command and option follows. Finally, a tutorial gives you a look at each function while working through some simple examples. The tutorial provides an introduction for using a monitor to debug machine language programs. It explains the use of breakpoints and stepping through programs while watching register values change.

Super Bug has a number of useful, well-designed features that make it a pleasure to use. The displays are carefully designed to utilize the CoCo's limited screen. You can select either Hex or ASCII display formats. In the ASCII mode, you can choose to display values larger than 127 as colored graphic blocks (the Color Computer's normal text graphic mode). Printed output gives both Hex and ASCII in 16-byte lines, using the full 80-column output.

The program determines its own location in memory and protects those addresses from being altered. This makes *Super Bug* very resistant to accidental modification. You can purposely alter the program by moving a copy to an unprotected area of memory.

Another friendly aspect of *Super Bug's* operation is its use of default address values. If you want to repeat similar

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operations, the start, end, or execute addresses may remain the same. You simply press ENTER to get the previous value. The fill command is also well suited to repeated patterns. It will replicate a string of bytes throughout a range of memory. This suggests an easy way to enter low resolution graphics patterns.

There are also a few negative aspects to *Super Bug*. The quick, mini-disassembler is much less useful than a full fledged disassembler. You will learn a lot about machine instructions from looking up the instruction codes in a book, but a full disassembly is a must for serious work on large programs. The disassembler built into Radio Shack's *EDTASM+* also allows the labels used in the assembly language program to be displayed as addresses. This symbolic reference is not available to a stand-alone monitor. You must be content with absolute Hex addresses.

The display of registers could be improved by giving the bit for bit display of the condition code register. This would allow you to easily see which condition codes are set by particular instructions.

Super Bug is a fine machine language monitor for debugging programs. It has the flexibility to serve a variety of needs. It will work on a minimal system, yet is powerful enough to aid advanced machine language programmers. Combined with an editor/assembler and a disk file editor it would serve the machine language student well.

(Mark Data Products, 24001 Alicia Parkway, No. 207, Mission Viejo, CA 92691, 16K to 64K tape $29.95, disk $32.95)

— Stuart Hawkinson

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Software Review

The Sourcerer Can Undo Machine Language Magic

One of the ways to sharpen up your BASIC programming skills is to pick apart a BASIC program that was written by someone else. This can either be a program published in THE RAINBOW or one that you have purchased. If you are into assembly language programming, however, there is no easy way to do this since you cannot just *LIST* a machine language program.

The Sourcerer, an OS-9-based disassembler, is a utility program that will help you to pick apart those machine language programs. It does this, in effect, by translating the machine language object code into assembly language source code. There are three different disassembly modes available with this program and the output can be sent to either the screen, printer or a disk file.

The ZAP mode of operation is the one that you will probably use first. In this mode, you can identify the ASCII strings and/or data tables in the program. This information is later used in the other modes in order to get a clean assembly listing. There are also two submodes available here. The first is the Alpha mode, which will display an ASCII dump of the program. The other one, Numeric mode, displays a hexadecimal dump of the program. By combining the use of these two modes you should be able to identify most, if not all, of the data areas in the program.

The LONG mode of operation will produce output that resembles a regular assembly output listing. It includes a line number (optional), the address, machine code, mnemonic code and the operands. Before the output is displayed you can enter the address ranges of the data areas of the program that you found by using the ZAP mode. Up to 32 different data areas can be defined, and you can also decide if you want to see FCCs, FCBs, or FDBs.

The SYMBOLIC mode of operation is the one that you will use when you are ready to try to modify and/or reassemble the program that you are working on. By directing the output to disk, you can then read it in using OS-9's editor to make changes to it or input it to OS-9's assembler to create a new program or just to get an assembly listing that you can then study.

Several control functions are also available in all of the modes when sending your output to the screen. These include pausing the output, changing the speed of the display, jumping from one address to another and back again, and of course, quitting the disassembly. There are also two versions of the program. One of them is a standard version and the other is designed for use with FHL's *O-PAK* to take advantage of its 51 by 24-character screen display.

The Sourcerer is an excellent OS-9 disassembler that provides all of the flexibility you need in order to get the job done. The documentation is clear and describes the various modes of operation. It does, however, assume that you essentially know what you are doing in the first place, so not a lot of detailed information is provided for the beginner. If you are looking to get into the innards of OS-9, *The Sourcerer* would be a good starting point.

(Computerware, 4403 Manchester Ave., Suite 102, Box 668, Encinitas, CA 92024, 64K/OS-9 disk $39.95)

— Gerry Schechter

Chambers Is A High Level Action Game

Just when you think Tom Mix Software is ready to rest on its laurels with its many successful adaptations of video games, the company comes up with another that builds upon the firm's reputation as among the more innovative suppliers for the Color Computer.

Chambers is the latest program, loosely based upon *Cosmic Chasm*. It features 20 levels of difficulty, with 20 to 35 rooms on each level, 50 different kinds of creatures, and 75 different patterns that the creatures follow.

The graphics are superior, the sound effects are excellent, and the degree of challenge on all levels is tremendous, even for the more seasoned computer game buffs.

As the hero in this fast-paced game—which also resembles *Berserk* but is not anywhere near as predictable—you must battle all kinds of weird and evil characters in each room on that level before blowing up the main reactor room.

There is a map for each level of difficulty in the upper right-hand corner of the screen. As you survive one room and go to the next, your progress is shown on the map.

Be aware, however, that getting out of any of the rooms is a feat because, in addition to the creatures, there are radiation balls at the base in the center of the room that fire at you at irregular intervals. If you get past those, there are human-seeking energy balls that can only be destroyed by positioning yourself so they will run into the base.

Each room includes four or five exits—depending upon the room's position in the maze—but the doors are locked until you eliminate the creatures. You can return to a room that you have survived, but the energy balls are reactivated and the challenge is renewed.

It probably will take you several days and many, many games to get all the way to the first reactor room, so be prepared for a long siege.

When you finally do get to the reactor room, you cannot exit through the doors because there is no key available. (Yes, you also need a key in each room except this one.) Also, in this room the energy balls will not blow up by running into the base. You must explode the reactor base by shooting it 20 times.

You have eight men when the game begins and a scoreboard in the upper left-hand corner of the screen keeps track of your turns. It also includes the current score, as well as the high game in the present series of games.

As for scoring, you get 100 points for killing a creature, 10,000 points for destroying the base in the reactor room., and 50,000 points for passing level 20, which is nearly impossible.

Pressing 'P' will freeze the game, while ENTER will resume action. If you want to change the color mode, just press 'M', and SHIFT CLEAR will alter the game action and go back to the title screen.

When the title screen is displayed, you may select levels one to 10 by using the right joystick. You can earn a new man when you earn 10,000 points.

I found *Chambers* to be a continuous challenge and the graphics fascinating. One set of creatures actually lines up in an 'MIX' formation. You never really know what kind of creatures you will be squaring off against or in what kind of pattern they will be.

The level of difficulty involved and the diversity of graphics and sound effects, and the levels of challenge, assures that *Chambers* will have a long lifespan.

(Tom Mix Software, 2485 Bradford N.E., Grand Rapids, MI 49506, $24.95 tape, $27.95 disk)

— Charles Springer

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Take A Fun Trip With *Travelin' Toad*

At last, a game that makes sense! Ever since the game *Frogger* appeared on the scene, I could never understand why a frog falling into the water would drown. Through the years, frogs have acquired the reputation of being competent swimmers. Even the Navy credits their skills by calling their highly trained swimmers "frogmen." Now from Prickly-Pear Software we have the *Travelin' Toad* game, a *Frogger* clone that makes sense.

The object of the game is to guide the toad from his starting position on the shoulder of a very busy highway to his hole along the river bank. First, the highway must be crossed. This is no easy task in itself because multiple lanes of traffic keep zooming by somewhat like an Interstate highway at the start of a holiday weekend. Once safely across the road, the toad must cross the river to its hole. Unfortunately, *toads can't swim*. Fortunately though for the toad, this is a rather busy river. There are logs and sunning turtles floating along the river and with some skillful jumping, the toad can leap from one to the next until he reaches his hole on the opposite side. Of course, if he misses, he drowns. This is where *Frogger* never made sense to me *—frogs can swim.*

There are a few additional hazards to the player of *Travelin' Toad* — it is a hot sunny day and toads can't handle blazing sun very well. So if the toad doesn't get across to its hole in a rather brief time limit it shrivels up and dies. When crossing the river, the turtles may sometimes decide to submerge, carrying the poor toad to its doom. Later screens add more hazards such as hungry snakes and alligators to imperil our little traveler.

Travelin' Toad is a well done game. It runs in 32K and uses the arrow keys to direct the toad. A two-page set of instructions come with the game and these are adequate for any user. As usual when I review a game, I submit it to the critical scrutiny of a panel of experts made up of my three teen-age sons and their friends. They agreed that *Travelin' Toad* was well done, fun-to-play and gave it their "seal of approval."

(Prickly-Pear Software 8532 E. 24th Street, Tucson, AZ 85710 Tape $24.95, Disk $29.95)

— James G. Kriz

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System Secrets — A Guide To *PEEKs* And *POKEs*

In past issues of RAINBOW and the other CoCo oriented magazines, several readers have asked for information on all these "mysterious" *PEEKs* and *POKEs* that "everyone" seems to be using these days. The question seems to be, "Where do I find this information and how do I use it once I've found it?" Well, if you are a faithful subscriber to RAINBOW and save all your back issues, you already have 99 percent of the information you seek. Of course, unless you have taken the advice of someone such as Mr. Joseph Kolar, in his "Taking BASIC Training" column, and made notes on important information, you may have a slight problem finding anything when you really need it.

Into this realm of confusion rides a booklet entitled *System Secrets*, by Raymond Coit (mounted on a white charger, of course!). This booklet is, in Mr. Coit's own words, "A comprehensive guide to *PEEKs, POKEs* and *EXECs* for the Extended BASIC and Color BASIC Color Computers." The booklet contains 20 mimeographed 8½ by 11 pages and covers topics such as; text and graphics on the text screen, sounds, keyboard and joystick input, program protection and manipulation and much more.

Although much of its contents has been already printed in one form or another, having it together in one neat bundle makes finding what you need much easier. For experienced CoCo users, this is a good reference guide. For the inexperienced users, this is like letting a little kid loose in a candy shop. There are many interesting items such as the *PEEKs* for the start and end addresses of both BASIC and ML programs, how to *PCLEAR0*, the *POKE* for creating multi-colored patterns in *PMODE 4*, the high speed poke and others. Unfortunately, there is also a great deal of CoCo "trivia." Items like a *PEEK* that returns the last octave used in a *PLAY* command; an *EXEC* that does a *CLS0*; an *EXEC* that prints a single space and others that seem to serve no real purpose. The other point I should mention is that most of the information contained in this booklet is only as good as the programmer who uses it. In other words, don't expect miracles; knowing what a *PEEK* or *POKE* does and using the result in a meaningful manner are two different things. Don't take this as a negative note, I just don't want the more inexperienced user to be disappointed. If you have any doubts then perhaps you should examine the "memory map" printed in earlier issues of RAINBOW. While *System Secrets* is much easier to comprehend, both sources contain a great deal of the same information.

Finally, if you believe you have enough programming experience to use this information or, on the other hand, want to experiment and learn by doing, then *System Secrets* should provide you with sufficient data to provide quite a challenge.

(RC Creations, 17251 Palatine N., Seattle, WA 98133, $5.95 plus $1.50 S/H)

— Ken Boyle

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Blast Those Aliens With *Intercept 4*

I was pleasantly surprised when I opened the envelope containing the 32K arcade-type game, *Intercept 4* from MichTron. Not only did they have their own custom-designed diskette jacket, they also had a very classy documentation booklet made of a thick, almost like cardboard, gray patterned paper, which makes reading the black type a joy. The documentation gives a brief description of the scenario, how to play the three different "sections" of the game, completion of a planetary system, entering high scores, loading instructions, and finally, a more detailed explanation of the scenario.

The purpose of *Intercept 4* is to protect colonized planets on the edge of your sector from hostile alien attacks. On the planet are eight colonies, each with the name of a Greek letter, and each having 125 members. Your job is to keep these little guys alive so "the Federation may gain a foothold in this section of the galaxy."

When the game is played, there are three main sections: above the planet, on the planet, and in the mother ship. When above the planet, try to stop the aliens from landing. You do this by shooting the fighters before they land. At this time, you have to use both joysticks; one to aim your weapons, and the other to determine the distance from your ship at which the shot will effect. This makes it much harder to hit the aliens, since you have to think in three dimensions.

If the alien fighters get past you above the planet, you will have to go down to the individual colonies in your Intercept shuttle to further protect the colonists. When there, the left joystick moves your shuttle above the colony and the right joystick aims your shuttle's weapons. Now the aliens will begin killing your colonists, so you must act quickly or you will be defending a dead planet.

The instructions say that when the mother ship appears you will have to destroy fighters protecting it. I refer to the instructions because I have never gotten to fight the mother ship. After you destroy all of the guardian fighters, you will have to travel through a tunnel to the reactor core. (Didn't I see this in a movie?) There will be nine ventilation ports in the core which open one at a time in a particular order. Your job will be to shoot each one in the order in which it opens.

When you hit all of the ports in the correct order, you must leave the mother ship. Then you will fly back into space and see if the mother ship self-destructs or destroys the planet.

When the entire system is completed, you get a bonus of the population left alive, up to 100 times the number of planets in the system.

At various times during play you have to make sure you don't expend all your energy. There is a scale at the bottom of the screen to show how much you have left at all times. When above the planet, shots (from huge weaponry) expend quite a bit of energy, which returns rather slowly, so you must be extremely careful. On the planet's surface, the shuttle uses a smaller amount of energy, but it has no power source, making the energy loss permanent (until you return to your orbiting battleship). In reference to energy, the reactor core in the mother ship acts the same as on the planet's surface. Energy is important because, not only is it needed to run the ships, it is also used in absorbing shots fired at you by the fighters while orbiting the planet.

I think this is a very good game, but it is not as exciting as many games. There are delays in the game, such as waiting for your battleship to pick you up from the planet, but they are minor ones (i.e., less than 30 seconds).

The graphics are well done, using *PMODE4* and making use of artifact colors. With the disk version you have the ability to save the top eight scores.

(MichTron, 6655 Highland Road, Pontiac, MI 48054, $27.95 cassette, $29.95 disk)

— James C. Sewell

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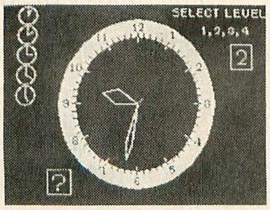

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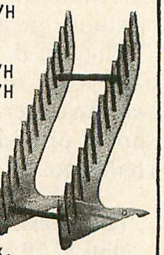

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(Disk-Haven Products, P.O. Box 443, Cockeysville, MD 21030, $18.99)

— Lynda Wilson

Submitting Material To the Rainbow

Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs which will be useful/helpful/fun for other CoCo owners.

Program submissions must be on tape or disk and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs. All programs should be supported by some editorial commentary, explaining how the program works. We're much more interested in how your submission works and runs than how you developed it. Programs should be learning experiences.

We do pay for submissions, based on a number of criteria. Those wishing remuneration should *so state* when making submissions.

For the benefit of those who wish more detailed information on making submissions, please send a SASE to: Submissions Editor, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will send you some more comprehensive guidelines.

Please do not submit programs or articles currently submitted to another publication.

Church Time Is Fun Time

Church Time is a fast-paced 32K text Adventure with a humorous twist. The story line requires you to find your Bible and escape from a locked house. You must do this in less than 16 minutes or you will be late for church and lose the game. Play is fast paced and simple enough for beginners. The humorous touches brighten the game in the absence of graphics.

The title screen asks if instructions are required and on command will present a review of the rules and a small hint. As usual in this type of program you must discover the capabilities and limits by experimentation. The 16-minute time limit keeps games from dragging on and lets other players have a chance. Because of this, there is no need to save a game in progress so this feature is not missed.

Documentation consists of a single sheet inside a title sheet. For a program of this sort it is adequate without being fancy. The program is written in BASIC and supplied on a high quality cassette with no attempt at copy protection.

(QCS, P.O. Box 1899, Duncan, OK 73533, tape $10.99)

— Charles Bream

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A Few Mods Make *Cassette Label* Great

When I first purchased my CoCo I had no trouble organizing my five or 10 cassettes. Unfortunately (or fortunately, depending on how you look at it), my library now numbers close to 100 cassettes and keeping things neatly labeled is a definite chore. Enter *Cassette Label* by Metric Industries, or so I thought.

The *Cassette Label* program arrives on cassette, naturally, and requires a minimum of 16K and Extended Color BASIC. The package contains one sheet of very well written instructions and 24 blank, pin feed labels to get you started. The program itself is written in Extended BASIC and preceded by Sugar Software's *Auto Run* loader. This, as many of you already know, requires you to *CLOADM* whereupon the program is loaded and automatically *RUN*.

The program will print five lines on each label consisting of two lines above the center hole in the label, two very short lines (words) on either side of the hole and one line at the bottom. Depending on the capabilities of your printer, you can choose combinations of standard, expanded and condensed characters as well as select the required Baud rate. The number of characters per line is, of course, directly dependent on the print type selected and the program will automatically center any text you enter. The program prompts you for all this information in a very user-friendly manner.

Now comes the somewhat bad news. The program is designed to handle control characters for three specific types of printers along with a general, catch-all option for others. The three specified are Radio Shack DMP-100, the Gemini 10X and the Gorilla Banana. As you can see, this does not exactly cover the world of printers, but then, that is what the general option is used for. I have a Radio Shack DMP-120 and when I tried to use the general option I had no success whatsoever. Even though I have expanded and condensed capabilities, I could not get them to work with this program. The problem lies in the fact that the program requests a single *CHR$()* control character for beginning and ending expanded and condensed characters. The author has failed to take into consideration that many popular printers require an ESC character, normally a *CHR$(27)*, to precede certain control characters. Although I can still print standard characters, most of the program's options are worthless for my printer.

Well, I said to myself, the program, after all, is written in BASIC and I should be able to make a few simple changes to rectify the problem. Unfortunately, I hadn't counted on Metric Industries' attempt to protect their program. I say attempt because, although it was relatively easy to make a backup copy, it was exceedingly difficult to modify the program. The first thing the program does is to disable the *LIST* command via a special poke, hence the auto-loader. Well, no problem there, simply *SKIPF* the auto-loader and *CLOAD* the program manually. Now comes the interesting problem! Metric Industries has managed to cram more characters per line than is normally supported by the BASIC *LIST* and *EDIT* commands. Well, I don't give up easily and armed with my trusty *Colorkit* from Prickly Pear Software, I examined memory directly to determine what certain lines really contained. Following are the corrections necessary to make this program work with printers requiring an escape character. I must caution you, however, that these corrections apply to Version 1.0 of *Cassette Label* and, should you have a different version, I cannot guarantee they will work.

The first modification I would suggest is to remove the *LIST* disable poke from Line 3. To do this replace Line 3 with the following two lines:

```
3 CLEAR700:DIMA$(40):DIMB$(40):DIMC$(10):DIM
D$(10):DIME$(10):DIMF$(10):DIMG$(160):DIMP$
(5):DIMR$(5):DIMY$(5):DIMH$(10):DIMI$(10):DIM
J$(10):DIMX$(5):DIMAS$(150): Q=0:KK=00:CC=128
+ 16*(4-1)+ 15:DD=128 +16*(1-1)+15:ZZ=3:CLSZZ
5 PRINT@128,"********************************"
```

The next change actually sets the control codes. If your printer doesn't require an ESC character to precede every control code, simply remove the unnecessary *CHR$(27)* from the following line: *HH$* = begin expanded, *II$* = end expanded, *JJ$* = begin condensed, *KK$* = end condensed.

```
59 CLS:HH$=CHR$(27)+CHR$(H):II$=CHR$(27)+
CHR$ (I):JJ$=CHR$(27)+CHR$(J):KK$= CHR$(27)
+CHR$(K):LL$=CHR$(0)
```

Now comes the modification of the printing routine. I rewrote this routine to use less code and therefore you must first delete several lines before adding the new code: *DEL 5040-6500* and *DEL 2030-2060*.

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```
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:TDF=31:KK=0
5050 IFY$="1"THEN6000
5060 A1$=HH$:A2$=II$
5070 IFY$="2"THEN6000
5080 IFY$="3"THENG1$=HH$:G2$=II$:GOTO6000
5090 TDF=51:C1$=JJ$:G2$=KK$:KK=1
6000 CLS:PRINT@233,"—PRINTING—"
6010 PRINT#-2,A1$;TAB(3+A);A$;A2$
6020 PRINT#-2,TAB(2+B);B$:PRINT#-2:PRINT#-2
6030 PRINT#-2,C1$;TAB(3+C);C$;TAB(TDF+D);D$
6040  PRINT#-2,C1$;TAB(3+E);E$;TAB(TDF+F);F$
:PRINT#-2:PRINT#-2
6050 PRINT#-2,G1$;TAB(3+G+KK);G$;G2$:PRINT#
-2:PRINT#-2
6060 GOTO14000
20030 GOTO6000
```

With these changes you can select the OTHER option for your printer type and enter the correct control codes and everything should work satisfactorily. However, if you wish, you may customize the program to automatically use your specific control codes by entering the following line where: H = begin expanded, I = end expanded, J = begin condensed and K = end condensed. The line is currently set up for my Radio Shack DMP-120.

```
7000 H=14:I=15:J=20:K=19:RETURN
```

Cassette Label is basically a well-written program that does the job of printing cassette labels with style. Its major limitation can be overcome with the changes I have provided and its relatively small price tag makes it a worthwhile utility for the cassette user.

(Metric Industries, P.O. Box 42396, Cincinnati, OH 45242, cassette $6.95)

— Ken Boyle

Editor's Note:

Metric Industries informs us that *Cassette Label* is now at version 1.1 and the above mentioned mods are not necessary. The OTHER option now permits ESC characters to be entered along with one or two *CHR$* control characters for each special printer function. This version of *Cassette Label* now supports virtually all printers.

Car Manager For When You're On The Road Again

Car Manager, a personal record keeper for summarizing your automobile operation and maintenance expenses, has a very limited use for the average auto owner. The information needed to input to the program is everything in that little dog-eared notebook in the glove compartment. To use the program, you must have all the information from your little book or other bits and scraps of paper.

The BASIC program is neatly done in its use of color and sound for the different screen displays and the program will run equally well from tape or disk. The author has used menu screens that simply require a single keystroke to select the various functions, a nice feature.

Despite the pleasant displays, the program has serious function deficiencies, even considering the low cost. I can see me now, after faithfully entering my gas cost, gallons and mileage for months, entering an incorrect value. All is lost; there is no editing of any entry. I feel the section for recording parts and repairs should include a date and a description of the expenditure. Currently, you can only enter a specific dollar amount.

The program offers a display of the summary on either the screen or the printer; however, when I selected the printer option, the "PRINTER NOT ON" message started flashing on my screen. (But it really was.)

If you assume the printer bug is corrected on future releases, the user must determine if this program will satisfy his needs for keeping records of the auto expenses any better than the little notebook in the glove compartment.

Editor's Note: 80 Custom Software advises us that the printer detection routine in *Car Manager* has been corrected to detect all makes of printers.

(80 Custom Software, 5720 Brooke Lane, Sylvania, OH 43560, cassette $12.95, disk $15.95, 16K Extended)

— Ed Sehlhorst

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Full-Screen Text Editing With *EDITTRON*

EDITTRON is a machine language program that enables you to perform full-screen text editing of your BASIC programs. This is the first line of the manual supplied with the program. I would like to emphasize the words "text editing," because my definition of a full-screen editor is slightly different. *EDITTRON* is based upon cursor-controlled and screen-editing functions. *EDITTRON*'s cursor control allows you to move the cursor freely within the text of the screen and manipulate whichever portion of the BASIC program that is viewed on the screen, meaning the program can be scrolled through from beginning to end in various ways — one line at a time or one screen full of the program at a time. The cursor can also be controlled to jump to the beginning of the program, jump to the end of the program, jump to the beginning of a line, or jump to the end of a line.

My definition of a full-screen editor is being able to position the cursor over any part of the screen and directly over-type on the screen. This would also include the line number, which *EDITTRON* does not allow in the cursor-controlled functions, but does allow for manipulation of the line number in the screen-editing functions.

EDITTRON's cursor-controlled functions are very easy to understand and a quick reading of the manual is all that is needed. Make sure your joysticks are unplugged, as *EDITTRON* will do strange things with the cursor if they are not. This is a slight omission in the manual, but anyone using any type of machine language utility should know this already!

Other cursor-controlled functions include searching the line for a character; searching the program for a line number; searching the program for a string of up to eight alphanumeric characters, which also includes the use of wild card characters; and repeating the find of a search for the next occurrence in the program.

Screen-editing functions include some commands Extended BASIC users will be familiar with. The program requires Extended BASIC to run, as it uses routines already built into the Extended BASIC ROM to perform some of its functions. Screen editing functions can be aborted by the use of the BREAK key. They include changing characters, inserting characters, deleting characters, extending a line, killing a line, and moving a line. These functions require only one key to initiate them and ENTER to complete them. The rest of the functions require the use of a control key prior to the particular function key. They include splitting a line into two consecutively numbered program lines, copying a line to another program line number, merging two program lines into one, and initiating auto-line numbering for entering more program lines.

EDITTRON also includes the option of a key-beep; which can be turned on or off. The program is hard to crash and can be restarted by simply re-*execing* it. The manual is well written and easy to understand, with instructions given on how to load *EDITTRON* into any size Color Computer. The disk version I received had many copies of the program on it to ensure a good copy could be loaded. I am not sure if they will continue this or if it was just for their review copy, but it is a good idea anyway.

EDITTRON is mainly for editing an existing program, as it will not work unless a program (any length) is already in memory. The manual does show, however, how to start a new program under control of *EDITTRON*. This program can be loaded before or after the BASIC program is in memory, but will not work at its normal load address if graphics are being used. An offset load must be used as explained in the manual.

Since *EDITTRON* uses direct jumps into the ROMs, I am not sure if it will work with all versions of the ROMs (I have BASIC 1.1 and Extended BASIC 1.0). A disassembled listing of the program would have been nice, but any good disassembler should accomplish this. Vidtron seems to be a sincere company and I am impressed with their product, although, I personally feel it is slightly overpriced, considering the current market situation for the Color Computer.

(Vidtron, 4418 E. Chapman Ave., Suite 284, Orange, CA 92669, cassette $30 U.S., disk $35 U.S.)

— Eldon Doucet

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Ed Ellers

You 'Write the Songs' With *Music $tringer*

Music $tringer, by Creative Technical Consultants, is a recently released utility for the purpose of creating musical strings with the Extended BASIC *PLAY* statement. The program is for 16K, Extended Color BASIC and comes only on tape but will work with a disk system. The program turns the computer keyboard into a piano keyboard. Tunes and melodies can be created from the keyboard and saved into a *PLAY* statement that you can see on the monitor screen. When you have the music the way you want it, you save the string to tape. Then you can append the *PLAY* statement to any BASIC program. Full and complete instructions are included.

The program is written in BASIC and thus can easily be modified. It also has no copy-protection added. Another nice feature is that the instructions for using the program are included in the program. Instructions for inserting the music strings into BASIC programs are found in the six half-pages of documentation.

Music $tringer gives you complete control of the *PLAY* command in BASIC, including note length, octave, tempo, volume, pauses, and exits to other substrings. The capacity of the program is 10 completed strings. You can recall any of the 10 stored strings at any time.

Once you *LOAD* and *RUN* the program, you are prompted for the tempo (suggest T2 or T3) and the starting octave (suggest O3). All of this can be changed at any time. The tempo you select will control how short or how long the notes will sound while you are hunting and pecking for the right notes. There are five different octaves that can be chosen with O1 as the lowest and O5 as the highest. Now you are ready to compose (or decompose!). Start playing notes and when you've found the right one, hit ENTER and the note will be stored in the string. The capacity of any one string is 255 characters.

To change tempo, note length, volume, or pause, press 'I' and you will be given instructions for adding a substring. This is very easy to do, but quite cumbersome. Being a musician myself, using rests (pauses) is just as important as using notes (sounds). I think that a key could have been designated for pauses so that you would not have to go to a substring for this common use. By pressing 'P', you can hear what your creation sounds like, for everything in the string up to that point will be played.

But what about mistakes? No need to worry. Use the 'E' command and now you are into Extented BASIC's editor and use the editor commands for inserting, deleting, skipping, etc.; whatever you need.

This program was designed as a utility, but I feel children would have a lot of fun with this one. The program has a lot of applications and I am sure that many computer users will find value in this program. The price is very reasonable!

Get *Music $tringer* and you can be like Barry Manilow and sing, "I Write the Songs."

(Creative Technical Consultants, P.O. Box 652, Cedar Crest, NM 87008, 16K ECB, tape $12.95 plus $2 S/H)

— J.D. Ray

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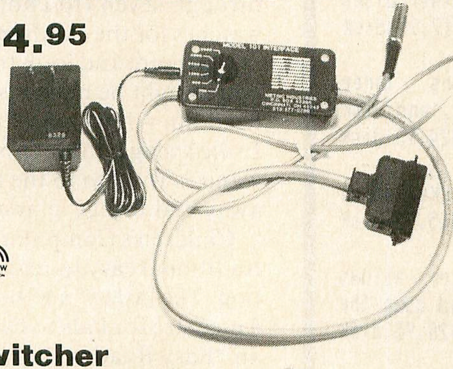

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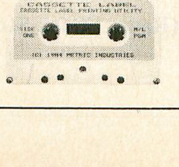

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Children Enjoy Learning With *Ernie's Magic Shapes*

It's every preschooler's old buddy Ernie and he's back this time as a magician in *Ernie's Magic Shapes*. Watch Ernie's magic wand transform shapes and colors into "shape pictures" that appear and disappear above his head. Then his wand makes a shape appear on his table. Now tell Ernie if the shape on the table is the same shape, size and color as one of the shapes above his head.

Children's Computer Workshop (an activity of Children's Television Workshop) has developed three educational series of games targeted for three age groups (three through six, seven through 10, and older than 10) combining fun with education. *Ernie's Magic Shapes* is targeted for ages three through six and is the first program in any series that we have used in our family. It is part of the "BASIC Pre-School Skills Series." In the two weeks I have watched my children use this program, I can see where *Ernie's Magic Shapes* will improve a child's recognition of shapes, size, color, similarities and differences, embedded figures, and whole structures from the various groupings of shapes and colors presented. All this while the children are having fun and enjoying every minute! *Ernie's Magic Shapes* is *CLOADed* and runs from a BASIC preloader or driver. Machine language programs are loaded from the BASIC program. While these programs are loading, in what seems like a very long time for 16K programs, the waiting is broken up by the magical and very delightful appearance of Ernie, getting ready for his magic show no doubt. Following this screen a brief four-line poem appears which really summarizes the whole game:

Abracadabra! Ernie's here!
Poof! His magic shapes appear,
Match the shapes—and colors,too,
And choose the game that's right for you!

Finally, Ernie and the poem disappear and a menu appears. The menu gives you seven options, an instruction mode and six game levels to choose from. The documentation urges you and the children to begin from the top starting with one, as each level is more difficult than the last. When you master each level, or tire of playing that level, you may return to the menu at any time by pressing CLEAR. The child is free to explore, play, and advance at his own pace.

The instruction mode, option number one, is very well done and gives you the actual Hi-Res screen used in the game. As shapes appear above Ernie's head and on the table a few words of instructions appear telling you what to do. This continues with different combinations of shapes and colors until you choose to leave the instruction mode.

Game levels one and two work with recognition of single shapes and combination of shapes using just one color for all the shapes. In game levels three and four multiple shapes combine in the same colors, or multiple shapes of various colors combine to form the "shape pictures." Levels five and six use complex arrangements of smaller, different colored shapes to create whole figures commonly recognized by kids, such as boats, wagons, airplanes, and trucks.

Essentially there are only two keys that the children use, the up-arrow and the down-arrow. They are appropriately used to put the shape on the table up above Ernie's head if it matches and to send the shape away if you don't think it matches. The only other keys used in the game are the CLEAR key (to return to the menu) and the numbers one through seven (to choose your game level options). Ernie watches for the children's input and you can see him look up at the figure and look to the side at the shape on the table. If you're right he nods his head. If you're wrong he shakes his head no. After you've matched all the shapes in the figure Ernie's magic rabbit pops onto the screen and hops onto his wand in rhythm to the music. Ernie then waves the pictures away and brings in another set. That's the program.

Children's Computer Workshop maintains Radio Shack's traditional easy to read and easy to understand documentation. The little 5" x 8" booklet that comes with the program is a nice size for kids to handle and could almost be considered an "Easy Reader" book. Perhaps some people would think the documentation is too simple and wastes a lot of time with the very basics, but I would think it would be better to be basic and complete than to be skimpy. As well as being very supportive and thorough, the documentation also has additional notes highlighted in red to help parents guide the kids and provide additional information. At the very end of the book there are activities such as cutting, pasting, drawing, and coloring.

I personally have not seen the other Children's Computer Workshop programs, but *Ernie's Magic Shapes* seems to be well worth the investment.

(Radio Shack Stores nationwide, 16K ECB, tape $19.95)

— Kenneth D. Peters

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Subtraction Drill Without A Thrill

"Drill" is defined in the dictionary as "a specific task or exercise designed to develop a skill or familiarity with a procedure." This is what *Subtraction Drill*, from CY-BURNET-ICS is about. This reviewer has seen many of these programs, some fantastic, some ordinary, some very dull.

Subtraction Drill provides the user with a varied selection of subtraction problems. Correct and incorrect answers are annotated with a short musical tone. Upon completing 10 correct problems, a rather uninteresting graphics display and "worn out" musical melody (one of four) is presented.

The documentation provided is well presented and very informative. The tape format provided has a speed-up *POKE* on one side and a "no speed-up *POKE*" on the other side of the tape. The program loaded from both sides of the tape without difficulty, and has an *Auto Run* feature with graphics display while loading.

The introduction to the documentation explains that the program "may be used with children in kindergarten through fifth grade." I feel that, though the drill is standard, the graphics and musical routines can cause the user (a child) to become bored. This, when added to the slow screen changing routine after an answer is entered, is quite tedious. My fourth grade daughter asked me if the "action" could be speeded up after an answer was entered, as the delay was causing her to lose interest.

The graphics in this program could certainly be improved. The program was written for 32K Extended BASIC, so why the numbers that are used are so crudely "drawn," and why the graphics "reward" screen is done in non-Extended BASIC graphics is hard to explain. And the musical melodies are really uninspiring. While this program may be appropriate for beginners in math, it may prove to be a hardship for older children to accept in terms of a comfortable math training program.

In conclusion, the content is adequate to teach subtraction, however the format is lacking. While this program may be appropriate in a classroom environment (I suggest perhaps a plastic coated card with the "control keys" be included), it may not be an appropriate investment for home use.

(CY-BURNET-ICS, 5705 Chesswood Dr., Knoxville, TN 37912, $24.95 tape, $29.95 disk)

— Stephan A. Brown

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Go Forth
With *SuperForth*

By Laurence D. Preble

What's faster than a speeding FOR-NEXT loop? More powerful than an interpreter? Able to leap complex algorithms with a speedy bound? It's the *SuperForth* compiler! Some of you may have read my previous RAINBOW review of two versions of FORTH for the TRS-80 Color Computer. I have excerpted and rewritten some of the introductory material here for those who know little about the FORTH language.

SuperForth is yet another language for the TRS-80 Color Computer. Some of you may just be beginning to explore the capabilities of Extended Color BASIC. Nonetheless, you may already have discovered some situations where BASIC is less than adequate.

Extended Color BASIC is a powerful programming language. It is easy to learn and comes with the computer. But, it is slow. Most of the really great commercial software is written in Assembler code. Any interpreter is slow because of the way it works — each program statement is interpreted and executed each time it is encountered. A single command may cause dozens of machine codes (the native language of the computer) to execute.

Assembler is fast, compact and very powerful. However, it is hard to learn and use. Even those who know and love Assembler, will tell you that it takes many times longer to write a complex Assembly Language program than to write a comparable program in BASIC. Assembler is fast because each command translates directly into a single machine code. There is a one-to-one correspondence. Working with the native language of the computer means that very efficient use of the machine is possible, hence the speed and small memory requirements.

The difficulty is that every type of computer has a totally different native language. Also, Assembly Language is even more basic than BASIC. If you want to print the word "HELLO" in BASIC, you can simply tell the computer *PRINT "HELLO"* and it does it. An equivalent in Assembly Language might go something like this:

```
LEAX HISTR,PCR
LBSR PDATA
JMP CONTROL
HISTR FCC 'HELLO
FCB $D,$A,$4
```

Despite the complexity and effort required, Assembly Language is by far the best way to go when it is necessary to squeeze every bit of performance out of a microprocessor.

Enter the happy medium: the compiler. A compiler shares the high level ease of programming like BASIC and much of the execution speed of Assembly Language. A compiler translates a programming command only once. Native machine code is generated and stored for future use. Hence a compiler has much of the ease of programming of any high level language, but also much of the execution speed of Assembly Language.

It is possible to make a compiler for any language. There are BASIC, FORTRAN, ALGOL, PASCAL and many other languages implemented as compilers. FORTH is a relatively new entry. It was designed by an astronomer, Charles H. Moore, in 1969. In 1973, commercial distribution and support was begun by FORTH, Inc. FIG (FORTH Interest Group) formed in 1978 to promote the use and development of the new language.

FORTH (and therefore *SuperForth*) is best described as a combination of interpreter and compiler. Commands can be translated and executed in one step. Commands can also be stored and recalled in their compiled form without further interpretation. That is why FORTH is fast when compared to BASIC.

Newcomers to FORTH will find the language syntax a bit odd. FORTH was designed to take maximum advantage of a computer's internal registers and stack(s). Because of this, it uses a method of data entry known as Reverse Polish Notation, RPN for short. Some hand calculators, like those made by Hewlett Packard, also use RPN. Our most familiar notation allows us to add numbers like this: 2 + 3 + 7 = 12. In BASIC we would say: *PRINT 2 + 3 + 7* (enter) the computer does the addition with the resultant answer: *12.* Reverse Polish Notation requires data entry like this: *2 3 7 + +* (enter). FORTH's rough equivalent of BASIC's *PRINT* is the . or period. So in FORTH we would say: *2 3 7 + +* . (enter) and the answer is calculated: *12.*

RPN is a little odd at first glance; but that is just because we are not used to it. Practice makes RPN second nature.

The basic unit of action in FORTH is a WORD. There are no line numbers to demarcate computer instructions. Instead, programming consists of defining words to be used by FORTH. Once a word is defined, it is yours forever (or at least until you tell FORTH to FORGET it).

Let's define a word that will multiply any number by two and then print the result: *:TIMESTWO 2 * . ;* The colon signifies the beginning of a definition. *TIMESTWO* is the word we are defining. *2 ** does the actual multiplication. The . does the printout. The semicolon signifies the end of the definition.

Now we enter: *7 TIMESTWO* (enter) and we get: *14.*

Once a FORTH WORD is defined, it can be used in the definitions of more FORTH WORDs. Programming begins with simple definitions and evolves into the more complex. A highly complex program could be embodied in a single FORTH WORD. To invoke a program, its FORTH WORD is simply typed in on the terminal, and execution begins.

If you only want to invoke a subroutine, you could just type the name of the word which embodies the subroutine. For example, the *SuperForth* package includes a *Breakout* type game. The game requires some coordination and is fun to play. As a novice to the game, I tend to run out of balls before finishing the task of demolishing the computer generated wall. To get around this problem, I wrote the following one liner:

```
:BMORE BREAKOUT 10 0 DO MAIN LOOP ;
```

BMORE becomes my new command. BMORE first invokes *Breakout. Breakout* is then followed by a DO LOOP (just like a *FOR . . . NEXT* loop in BASIC). The DO LOOP repeatedly executes the *Breakout* subroutine called MAIN. This has the effect of giving me 10 more balls.

FORTH, by nature, is a language that is never completely defined or finished. That is because new WORDs can continually be defined; once defined, they become part of the language. At present, there are several hundred FORTH

WORDs that are considered standard. Nonetheless, FORTH novices are usually surprised by the seeming lack of some of their favorite functions. No problem, if a function is missing, it can nearly always be constructed from the existing FORTH vocabulary. If super high execution speed is required, *SuperForth* even has a provision for patching in Machine Language code. Unfortunately, this version of FORTH requires that machine code be loaded in as a separate entity. Some versions of FORTH allow new FORTH WORDs to be defined from Assembly Code or Machine Code, better integration into the system is the result.

I should mention here that INTEGER arithmetic only, is considered standard with *SuperForth* as with all versions of FORTH. Surprised? Remember, if you really need floating point functions, there are available methods for making them. Anyway, floating point operations are inherently much slower than integer operations. Also, *SuperForth* does have built in provisions for double precision integers. Most experienced FORTH programmers find that they can do without floating point.

Disk usage by most implementations of FORTH is a little different from Disk Extended BASIC. Most FORTH implementations divide their data blocks into Screens instead of the more familiar file structure. A Screen is simply all the data that will fit on your television screen at one time. Each Screen of data or FORTH definitions is given a number and stored sequentially on disk. Each Screen may contain numerous FORTH WORDs. When a Screen is *LOADed*, all the vocabulary contained on the Screen becomes part of the system's current vocabulary.

SuperForth does not follow this tradition of Screen file structure, which is fine with me. The Screen format method is incompatible with Radio Shack disk format. That makes it kind of tough to edit your data unless you write your editor in FORTH.

SuperForth, on the other hand, is totally compatible with Radio Shack disk format. That means you can use *Telewriter-64* or any disk oriented editor you please. You could even use Computerware's BASIC compiler for part of your program and interface the compiled output to *SuperForth*.

Installation

SuperForth is supplied on disk or tape. The installation of *SuperForth* is quite straightforward. First, make a backup copy of the supplied disk using BASIC's standard *BACKUP* command. This is not strictly required, but definitely a good idea with any new software. Put away the supplied disk in a nice safe place in case something terrible should ever happen to your new copy. Put your new disk into drive zero and type in: *LOADM "SuperForth"* and press the ENTER key. When your computer says "OK," type EXEC and press the ENTER key.

Extra *SuperForth* vocabulary can be loaded from tape or disk as desired.

Documentation

The package supplied will not teach you the FORTH language if you are a novice. The implementation of FORTH itself is excellent and has some unique features; however, the documentation supplied assumes you either already know FORTH or are willing to purchase one of the introductory books available. I would suggest contacting the FORTH Interest Group and receiving their magazine: FORTH Dimensions. The documentation supplied for *SuperForth* describes mainly the differences and enhancements of *SuperForth* by comparison to the standard FIG-FORTH.

Enhancements

SuperForth is supplied with considerable enhancements over the accepted standard FORTH. Enhancements consist of extra vocabulary. WORDs uniquely useful to the control of the Color Computer's graphics capabilities are included. FORTH WORDs for the composition of computer music and arcade sounds are another enhancement. Also, since *SuperForth* follows the Radio Shack file structure format, vocabulary is included to manipulate both disk and cassette files. The following words are unique to *SuperForth* and do not appear in the Fig-FORTH standard:

#IN
*Q
*S
BASIC
BIP
CCLOSE
CLEAR
CLOAD
CLOSE
CLS
COLOR
CONS
COPEN
CREAD
CWRITE
DEVNUM
FILES
ICLS
JOY
KEY*
LINE
LOAD
OPEN
PAGE
PIXEL
PAGE
PCLS
PTC
READ
RESET
RND
SQRT
VARBL
VERIFY

Speed Demon

Earlier, we mentioned speed. We know a compiler is supposed to be fast, so how fast is it? It is so fast that *SuperForth* DO LOOPS can be used to generate arcade-type sounds. For example, enter the following definition:

```
SPORT : NOISE 5000 0 DO RND BIP LOOP ;
```

This sends a random number to the sound port each time the loop executes. The result is a white noise generator. Delays can be added to create explosions, gun shots and jet plane-type effects. If you try something similar with a BASIC statement, all you will get is a slow buzzing sound. BASIC just is not fast enough to do the job.

Why Go FORTH?

Some of you may feel that it is not worth the effort to learn a totally new computer language. After all, considerable effort is required to learn FORTH. However, if speed is your main requirement, or if laboratory systems control is your aim, or if code compactness is required, then FORTH is an excellent alternative to BASIC or Assembly Language.

(Spectrum Projects, P.O. Box 9866, San Jose, CA 95157-0866, or P.O. Box 21272, Wood Haven, NY 11421, disk $39.95 plus $3 S/H)

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Address Some Labels With *Address One*

Do you maintain a member list or send out bills on a regular basis? How about a Christmas card list or invitations for the annual apple pie contest? Whatever your mailing needs, *Address One* will help you in this chore by addressing your labels on standard one-up, 3½" long by $^{15}/_{16}$" wide blank labels.

The version I received for review was disk-based, and can run in any 16K Extended BASIC CoCo.

The main menu of *Address One* offers the following options: Open New File, Add a Record, Complete Label Set, Selected Label Set, Edit a Record, Exit to BASIC, and Help and Info.

Upon loading and running the program, the first thing to do is choose item 1. This will open a data file on your disk with the name *ADDRFILE/DAT,* which will be used to store your information. You may then enter your records with item 2.

When you want to add a record, the screen will reveal a blank form, clearly showing where each field should be entered. Separate categories are provided for first and last names, address, city, state and ZIP. An extra field called "Code" is provided for the grouping of records together. For instance, a Coding system can be used for each state; then if you want to print labels for those records that fall into the Maryland category, simply choose the selected label set. It is a good idea to use the Code field if you plan to print selected labels any time in the future. There is also a field for comments which may or may not be printed as you wish.

The Edit function will allow you to correct or modify any information contained in any of your records. There are also provisions to search for any particular string of data and view your records on the screen without printing them.

Address One stores all information on disk and allows for a maximum of 600 records per file. If you have a need for more records, you may use another disk. The program allows the definition of only one disk file. It would have been nice to be able to define another disk file (although this is easily modifiable seeing that the program is in BASIC). The select option will let you print only those labels that you want.

A few features that would have been useful in this type of program would have been to provide a field for the name of a business. As it stands, there is no way to print an address that includes the name of a business unless you put them on the same line. A delete record function could have saved some time also. The way you must do it is to blank out each field that you have entered or substitute those field contents with new information. A sort function would also have been handy. Also, a provision for two across, or at least a function to define other kinds of stock labels would have been convenient.

All in all, keeping in mind that *Address One* is *not* a database, but a means to address your mailing labels, I feel that it is a good program and a great buy at the price.

(West Bay Company, Route 1, Box 666, Whitestone, VA 22578, $20 tape/disk)

— Steven Schechter

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Hint . . .

Cold *POKE*

Here is a reader tip that you may be able to use, as I have not seen it published yet. For a cold start, type *POKE 113,0:EXEC 40999.* This can be implemented into a program or simply to clear the RAM without having to turn the machine off.

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Updated *Dynacalc*: Breakthrough With Bonuses

Good computer programs get better with age. *Dynacalc*, which was first reviewed in THE RAINBOW, in August 1983 has now been adapted to operate under Radio Shack Disk BASIC. Formerly, the premier spread sheet for the CoCo was available only for FLEX, but now it is within the reach of anyone with a 64K CoCo and a disk drive. While this is a breakthrough in high-level software for CoCo users, Computer Systems Center not only lowered the price, but also added several new features.

Dynacalc is a second generation *VisiCalc*-like spreadsheet program. In addition to a remarkably similar command set, several advanced features have been added, such as sorting, a keystroke memory and graphics. If you are at all familiar with *VisiCalc*, a minimal amount of time will be spent learning the new system. For those of you just learning, typing a simple "?" at any prompt will fill your screen with an outstanding help screen explaining the alternatives at your command. A 57-page users manual is well-written and can be used for command references as well as some helpful operating tips.

Plenty of Reference Material

Have you ever looked at the bookshelves in your local computer store? Literally dozens of books have been written on the uses of *VisiCalc*. These programs, sometimes called templates or shells due to fact that they overlay information on a blank worksheet, will all work with *Dynacalc*. No more having to re-invent the wheel.

System requirements

As previously mentioned, *Dynacalc* will work with any Disk Extended Color BASIC 64K CoCo. The built-in ROM software is totally disabled so it will work equally well on any combination of ROM versions. The disk supplied cannot be copied using the *BACKUP* command, but the authors have included a unique way of permitting working copies to be made while still protecting their product. Every master is given a serial number. By running a program called CREATE you can make as many bootable copies as you desire, but you can't duplicate the master. CREATE customizes the program allowing the use of various disk drives (including 6 ms. drives) and printer configurations. Any ASCII printer will work for normal spreadsheets, but dot-addressable graphics are necessary to print high-resolution screens. Standard printers such as Radio Shack, Epson, Gemini, Okidata, NEC and C. Itoh are on the menu of printer choices. Computer Systems Center will help with other printers.

What is a Spreadsheet?

For newcomers, a brief explanation of spreadsheet basics is in order. *Dynacalc* is nothing more than a blank 256 x 256-cell accounting worksheet, each row identified with a letter, each column identified with a number. The top-left cell of the sheet would have the notation "A1." Any cell can contain a number, a string or a formula. I guess a good

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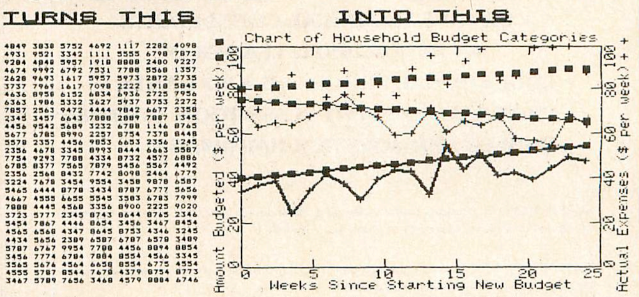

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example would be a yearly budget. Each column would correspond to a month. Each row would correspond to an income, or expense, category. Strings would be located in Row A and Column 1 to identify the cell values. Formulas would be used at the end of each row and column for the summation of these values. After setting up the worksheet, all that it takes is the positioning of the cursor and the right values to instantly tell if ends meet. I use *Dynacalc* in my business to estimate jobs. Both material and labor rates are extended just by inputting a quantity. *Dynacalc* allows 33K of worksheet memory, or room for about 2750 numeric cells.

Use Your Joysticks

One nice added feature of the new version is the availability of joystick or Mouse positioning of the cursor. After giving your CoCo the magic command *RUN"DYNA CALC"*, a white background 51 x 24 screen appears with the introductory logo and serial number. A simple touch of the fire button on your joystick gives you an alternative to the normal arrow keys used to place yourself in any cell of the 256 x 256 matrix.

I also noticed the improved screen response over the FLEX version. I was told that the previously sluggish screen updating was a funtion of FLEX I/O. The present quick rewrite of the screen is a welcome relief. A cursor has also been added so that visual indication of the "cell in use" is available.

Keysaver

Dynacalc's Keysaver feature permits multiple execution of typed commands. Suggested uses include setting column formats, deleting rows or columns and blanking ranges of cells.

Graphics

One totally new feature provides the ability to graph data in the form of a line, bar or pie chart. Several nice features are added to make the graphs attractive and functional. One important, and user friendly, function is the Caption mode. Text may be added to your charts for truly professional presentations for business, etc. Scaling and Averaging are implemented. Charts may be saved to a disk file for future reference, or printed if you so desire.

Comments

A full summary of the commands and functions was included in the review of the previous version. Logical functions have been added such as AND, OR, NOT, etc. A Locate Label command has been added in addition to those already discussed. Error trapping is implemented. Obviously, *Dynacalc* is my choice for a CoCo spreadsheet. Scott Schaeferle, and Joe Turner of Computer Systems Center, are to be congratulated for a job well done.

I wonder what's going to be in the next version? Maybe a version for CoCo OS-9. We'll see!

(Computer Systems Center, 13461 Olive Blvd., Chesterfield, MO 63017, $99.95 disk only)

— Dan Downard

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Presidents Wins In A Close Race!

In a year that includes a presidential election, it seems appropriate that a program called *Presidents of the United States* would appear on the scene. The tape includes a 16K version on one side and a 32K version on the other. There are different loading instructions for Extended BASIC and non-Extended BASIC, and these are explained in the very complete and well-written documentation.

The program offers three modes. In one, the user can pick a president of the United States and study certain pertinent facts about him. Facts appear on the screen and allow the "player" to study at his leisure. I found the facts to be written in a brief manner like someone taking rapid copious notes in an American history lecture hall. It brought back memories of when I wished I had taken better notes to study. The other two modes are "game" formats. The first is a rather interesting game in which up to five clues are given, one at a time. The player must guess what president the clues describe. The faster the player identifies the correct president, the higher the score earned.

The other game mode is multiple choice. The name of the president in question is given and three facts are presented. The player must choose the fact that correctly corresponds to that president. The players' (up to eight) scores are kept and a scoreboard appears at the end of the game. I found the multiple choice game to be considerably easier than the other, but both were very enjoyable.

Actually, when I received this program from RAINBOW, I was less than enthusiastic. History was never one of my strong points. Being a professional, I knew I had to be as objective as possible, but I thought that would be difficult. I was wrong. I really enjoyed this program and found it to be much more interesting than I had anticipated. It is also rather easy to keep the program current and/or to modify it. Full instructions are given in the documentation. There was, however, one thing I found particularly confusing. The author has chosen to use the BREAK key to advance the program rather than the ENTER key. Each time I typed an answer, I would automatically press ENTER. That would void my answer and I would have to retype my answer and press BREAK. However, this was explained quite clearly in the documentation. All in all, I think the positives of the program outweigh the negatives. I'll cast my vote in favor of this president. Now who will I vote for in November?

(Sugar Software, 2153 Leah Lane, Reynoldsburg, OH 43068, 16K/32K tape $24.95, 32K disk $29.95)

— Stephanie Snyder

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Keep-Trak Is An Organized Accounting System

Keep-Trak is the first software offering from a newly developed software firm called THE OTHER GUY'S SOFTware, located in Logan, Utah. Joseph Nielsen and Curtis Wood are the "other guys" and I feel they will definitely make a mark on the Color Computer software market. *Keep-Trak* is a double-entry accounting system which boasts a 2400 record capacity with over 900 accounts. Also, this package comes at the low price of $14.95. Here is what you get!

Keep-Trak is a general ledger, double-entry accounting system. Double-entry means that you enter every item twice in order to balance the system. There are shortcuts to this type system and they are explained in the manual. This is a disk-based system only. It will not work with a cassette system. Memory requirements are not stated, but since the system uses direct access disk files, it should work rather well on a 16K system.

The disk comes with 14 programs. The initialization programs are written in BASIC, while the financial programs are written in binary or machine language. This financial package maintains account categories for assets, liabilities, income and expenses. Transactions are entered into the program as a journal entry. These transactions are compiled by the various options and the user then has access to a balance sheet, an income statement, general journal or ledger and a trial balance. Monthly totals are retained by the system for yearly summaries.

The documentation for *Keep-Trak* is adequate for using this package of programs. It comes in a 5½ by 8½ size manual. I am sure that accounting practices and procedures will not come easily to every person. The manual assumes that you have some working knowledge of accounting practices. The material provides sample printouts, and a complete table of contents for reference. As with any software, one must read the manuals to fully understand how the program will work. *Keep-Trak* has a few "importants" in the system, and one should know where these are so as not to cause severe problems in using the software. For example, in using the trial balance program, you are asked, "Is this a final balance?" If you respond with a "yes," then the computer will consolidate the records and the old file will be deleted. This is necessary, but one should use caution at this point or you will lose important information. The manual gives full instructions.

The only fault I can find with *Keep-Trak* is the fact that this system is completely printer-oriented. After the initial data has been entered, all financial reports are printed only to a printer. Now, I know it would be foolish for anyone to think that they could operate any intelligent financial software without the aid of a printer. However, having the information on the screen for reference would be nice. Because the financial statement programs are generated from machine language programs, they cannot be altered easily.

THE OTHER GUY'S SOFTware plans to release other packages to go along with *Keep-Trak*. An accounts receivable and accounts payable package is on the way!

Who can use *Keep-Trak*? Well, any small business or home accountant could. A printer and disk system are required.

(THE OTHER GUY'S SOFTware, 875 South Main, Logan, UT 84321, $14.95 disk only)

— J.D. Ray

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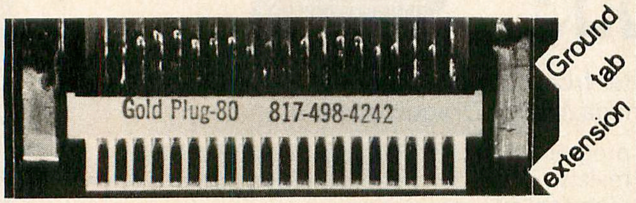

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The Rainbow's Second Annual
SIMULATION CONTEST

Because of the immense popularity of Simulations and the superior quality of the programs submitted in last year's competition, THE RAINBOW has announced plans for the Second Annual Simulation Contest.

Last year, our contest judges relived the Civil War, traveled to the moon, to Mars and beyond, went bankrupt running a restaurant, made a million bucks as a manufacturer, survived a flood, lobbied for bills in Congress, assumed responsibility for mid-air collisions as an air-traffic controller, drowned while learning to sail, experienced the thrill of victory in the seventh game of baseball's World Series, and made it big with our own software business(Many of the entries in the 1983 contest are featured in a book on Simulations, which THE RAINBOW plans to publish in early fall.)

We're looking for an even greater variety of situations this year and expecting to see great improvements in graphics presentations because of the advancements in programming tools and knowledge since the first contest.

Many of THE RAINBOW's generous advertisers will be donating some exciting prizes as they did last year (and in our recent Adventure contest) when our winners carted off Radio Shack disk drives, an Epson printer, and dozens of other prizes that included a wide variety of peripherals and high quality software. Among those companies donating prizes:

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Contest submissions must be on tape or disk and it is best to make several saves, at least one of them in ASCII format. We really do not have the time to key in programs, obviously. All entries should be supported by some editorial commentary, explaining how the program works and loads. Please do not submit entries that are currently submitted to another publication.

Your entry must be received by THE RAINBOW no later than September 1, 1984, to be eligible for the competition.

This promises to be the THE RAINBOW's most exciting contest yet, and, as usual, the winning entries will be published when we announce the results in an upcoming issue.

RULES: All programs must be original works, no "conversions." Entries must be postmarked by September 1, 1984, and become the property of Falsoft, Inc., publisher of THE RAINBOW. Decision of the judges is final. Duplicate prizes will be awarded in the case of ties. Winning programs to be featured in a special RAINBOW Simulation issue. Mark entries "Simulation Contest Editor" and send to THE RAINBOW, P.O. Box 385, Prospect, KY 40059.

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The Multi Math Driller

By Fred B. Scerbo
Rainbow Contributing Editor

(Editor's Note: If you have an idea for a useful program, educational or otherwise, which you would like to see written for the CoCo, submit your wish to Fred, c/o THE RAINBOW. *We don't promise that any given wish will be granted, but if the idea looks especially challenging, Fred might be able to grant your wish in an upcoming column. Please remember to be specific in your wishes and remember that this is* BASIC! *All programs listed in the "Wishing Well" are for your own use, but remain the property of the author.)*

Here we are ready to start another school year and already the air is buzzing with educational catchwords such as "computer aided instruction" or "computer literacy." Give a teacher a computer, and often he or she will find a way to incorporate it into the classroom structure. Give one to an administrator, and the buzzwords start flying. "We need CAI !" "Let's get in-service workshops for our staff!" "The public demands it !"

For those who face such pressures and for those who just want to help their youngsters develop some basic math skills, this month's "Wishing Well" is for you. Many of the wishes I have received recently have had a common thread. It seems that there are still a large number of people who have not made the upgrade from Color BASIC to Extended. If all you have is a Color BASIC CoCo or MC-10, then past programs such as *Rockfest* and *Baseball Fever* are of little use to you. Since some of your requests have specifically asked for something *graphic* for those without Extended Color BASIC, I decided to polish up a program I use almost daily. The program is *Multi Math Driller*.

In order to make this program fully functional in both Color BASIC and MC-10 BASIC, a little surgery was necessary. First, neither language has Extended BASIC's command *STRING$*. For those not familiar with this command, *STRING$* lets you print a continuous string of a specific *CHR$* (character string). Thus, the command *STRING$(128,65)* would print a string of 128 A's on the screen, since *CHR$*(65) is the letter 'A'. This problem can be solved in Color and MC-10 BASIC by using a loop and a *PRINT@* statement. This is slightly slower than using *STRING$*, but this way the results are perfectly workable in all three versions of the language.

> ***"Give a teacher a computer, and often he or she will find a way to incorporate it into the classroom structure."***

Another such command which is missing from MC-10 BASIC, but not Color BASIC, is the use of *ELSE* in an *IF.....THEN* statement. *ELSE* is a much more efficient command to use when comparing statements in BASIC, but you

(Fred Scerbo is a special needs instructor for the North Adams Public Schools. He holds a master's in education and published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.)

would be amazed to know that not even an Apple IIe has an *ELSE* command. The solution to lacking *ELSE* is simply to use more than one *IF.....THEN* statement. This once again works with all three BASICs. I wanted to make a point of this distinction since some of you might wonder why I omitted the *ELSE* which is one of the CoCo's greatest strengths.

One command I do not use too frequently is the *POKE* command, since many times, the same results can be obtained by other means. This is not the case, however, if we wish to use inverse numbers on our text screen. You will notice from the listing that some of the credits are printed in lowercase inverse on a black, *CLS0* screen. I often find this much more attractive when using the CoCo's low-resolution *CHR$* graphics on a black background. However, there are no *CHR$*s which generate an inverse number, so we do have to *POKE* them to the text screen.

This causes two immediate problems for us. First, it requires that the person typing in the program not make any mistakes in the *POKE* numbers when keying in the listing. Use the wrong *POKE* and you might lock-up the computer, losing everything you have typed in. Therefore, take great care when typing in all *POKES.*

Secondly, while the commands in Color BASIC, Extended Color BASIC, and MC-10 BASIC which overlap are the same, this is not true of the *Memory Map*, especially when we are dealing with *POKES*. The text screen on the CoCo begins at memory location 1056, while the text screen for the MC-10 begins at location 16384. Therefore, a *POKE* for one machine would cause numerous problems with the other machine, not to mention not doing the task intended. Hence, to make this program appear as one listing and not two, I have included a variable MC at the beginning of the listing (Line 130) and identified it with a REM statement in the line before. If you are typing this listing into a CoCo, the value for MC will be zero. If you type this into the MC-10, then change the value of MC to equal 15360 as indicated in the REM statement. You will notice that all *POKEs* in the program have included a value plus MC. Thus, if MC=0, then the program will *POKE* the value to the location required for our CoCo. Use the higher value and the *POKE* will be offset to the correct value for the MC-10. This appeared to be the easiest way to insure that the listing would work with a minimum amount of modification since it is easier to change one variable than it is to change a couple dozen *POKE* statements.

Since this program is designed to use either a joystick or the space bar on the keyboard, you may wish to delete the *PEEK* commands which are identified in the REM statements as not belonging in the MC-10 version (Lines 700 and 1380). Since the MC-10 has no joystick, you must use the space bar.

Another command I deliberately left out of this listing was the speed-up command of *POKE65495,0*. There were two reasons for this. First, the MC-10 does not have this *POKE*. In fact, it does not need it since it runs slightly faster than the CoCo. Secondly, the program really does not need the speed-up since I have included a speed selection at the beginning of the program to

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help slow it down. If you really want the program to run faster on the CoCo, then include the *POKE65495,0* near the start of the listing. Just be sure to *POKE 65494,0* before trying to save the program to cassette or disk or you will see your efforts quickly slip into the twilight zone, never to return.

One final warning, you will notice there are a large number of *DATA* statements at the end of the program. Take care to type these exactly or you may get some strange results. Recently, I have received letters from people who have done nothing more than type the *DATA* statements incorrectly. Take your time and you will avoid this problem.

Now that we have dealt with all the technical parts, let's see what this program and wish are all about.

The Driller

The original idea for *Multi Math Driller* came from several math teachers I have known. They seemed to think that if the student could "shoot" the correct answer to a math problem, then the learning process would be much more fun.

Since everyone has a "shoot-em up" game, (and some of my original submissions to RAINBOW such as *Zelda's Bat Bottle, Oh Gob!, Alpine Aliens,* and *Snail Invaders* were criticized for being all "shoot-em ups"), I decided to take a different approach to this problem. Since there is very little that can be done with the low resolution graphics in the text mode, I figured that I could at least draw an oil rig in several colors and have it look like an oil rig. This way students could DRILL for the correct answer rather than SHOOT at it. Thus, with a little time and care, I was able to combine the necessary *CHR$s* to create my oil rig.

The next problem would be how to make the answers scroll across the screen from right to left. Top to bottom scrolling is easy, but this posed a more difficult problem. The solution had several steps. First, after selecting a problem, the correct answer would be calculated and thrown into a pool of answers. Dummy answers would also be generated. These numbers would then be translated to *STRING* information using the *STR$* command. The program would then tie these strings together, with spaces in between, until I had a string exactly 32 characters long: the width of my screen.

Therefore, to get the right to left scrolling, I developed several lines that would use the *LEFT$* and *RIGHT$* commands to take the first character of this string and then tack it on to the end of the string. This is done in Lines 640 through 660. Each time these lines are passed the first character is passed to the end of the string, and the string is reprinted in the same location. This gives the illusion of it actually scrolling from right to left.

With this scrolling technique in effect, at some point, the correct answer will eventually run by the bottom of the rig. Therefore, what we next need is a routine to allow the student to signify when the correct answer goes by. If the student presses the space bar at that given moment, then a drill will go down to the answer. The same is achieved with the CoCo version by using the right joystick fire button. The program recognizes the value of the numbers below it by use of

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the *MID$* function which takes out the middle of the string for our use.

If the answer is wrong, the screen prints TRY AGAIN, and waits until the correct answer is selected. If the answer is correct, the screen prints a very colorful changing display of CORRECT. (Here is one of your Low-Res graphic rewards.) If all 20 problems are answered without an error, the oil well will erupt with a golden gusher accompanied by a sound display. The number of MISSES is later displayed. The program can be restarted by pressing ENTER. If you wish to have more problems displayed, change the value of YS in Line 110.

The program also includes several other features. You may select a multiplication table from one to nine. You may also select whether the problems will be assorted with problems from a lower multiplication table. (DO YOU WANT THE TABLES ASSORTED Y OR N ?) You may also control the speed at which the answers run by the bottom of the well by selecting the speed at the beginning of the *RUN*. After a problem has been completed, you may either wait a few more seconds, or move on to the next problem by pressing any key or pressing the fire button. This prevents the screens from running by a slower reading student too quickly.

The Colorful Screen

One of the best things about this program is the colorful, large graphics characters that print out on the screen. The *CHR$* numbers for these letters are included in the *DATA* statements, and are part of a larger subroutine I have used in many other programs. I think you will find these characters very effective, but they remain under the copyright for this program, which means that you cannot remove them and use the routines in any other program. While I am happy to share them in this program, they do represent a slightly different way of displaying colorful text and, therefore, remain subroutines I plan to use time and time again in my own software. (In fact, several other RAINBOW programs have recently had this same stipulation tied to them.) Still, the subroutines may give you a better insight into how problems like this can be solved.

Conclusion

Once you have successfully keyed in this program, I think you will find that it is a very effective way of reviewing multiplication tables. With a little modification, I am sure that we can come up with some other variations on this theme to teach and review other skills. Send me some wishes and ideas and who knows what we might be able to come up with. Just keep those ideas coming.

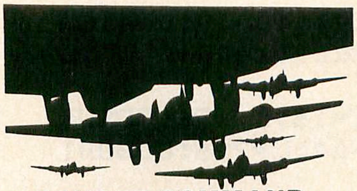
Coming Attractions

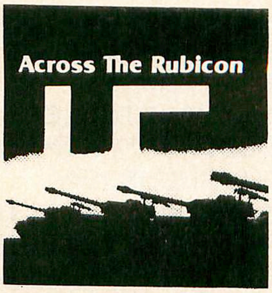
As I mentioned last month, shortly I will be sharing the pairing programs which can be used for any type of competitions, sports or otherwise. Also still in the works are *Rockfest II*, a quick way to prepare resumes and a few other secrets that will soon be in your hands. Keep watching. The best is yet to come.

220	204
400	185
580	216
800	82
930	51
1160	149
1360	209
2140	135
END	212

The listing:

```
10 REM***************************
20 REM*  MULTI MATH DRILLER     *
30 REM*   BY FRED B.SCERBO      *
40 REM*  COPYRIGHT (C) 1983     *
50 REM*     BY IMB AND THE      *
60 REM*  PROGRAMMERS' GUILD     *
70 REM***************************
80 CLS0
90 CLEAR500
100 FOR ZZ=1TO96:BB$=BB$+CHR$(12
8):NEXTZZ
110 BR=30:YS=20
120 REM IF MC-10 THEN MC=15360
130 MC=0
140 DIM A(45,9),B(4,12)
150 FORI=2TO11:FORY=1TO9:READ A(
I,Y):NEXTY,I
160 FORI=19TO44:FORY=1TO9
170 READ A(I,Y)
180 NEXTY,I
190 FORI=1TO4:FORY=1TO12:READ B(
I,Y):NEXTY,I
200 FOR ZZ=0TO31:PRINT@ZZ,CHR$(1
88);:NEXT ZZ:FOR ZZ=320TO351:PRI
NT@ZZ,CHR$(179);:NEXT ZZ:FORI=0T
O21:SET(0,I,4):SET(63,I,4):NEXT
210 W$="MULTI":C=32:L=38:GOSUB10
80:W$="MATH":C=16:L=136:GOSUB108
0:W$="DRILLER":C=64:L=227:GOSUB1
080
220 REM <SHIFT><0> FOR LOWERCASE
230 R$=CHR$(128):PRINT@417,"by"+
R$+"fred"+R$+"scerbo"+R$+R$+"cop
yright";
240 POKE1467+MC,49:POKE1468+MC,5
7:POKE1469+MC,56:POKE1470+MC,51
250 PRINT@452,"the"+R$+"programm
ers"+R$+R$+"guild";
260 POKE1491+MC,39:GOSUB1360:FOR
I=417TO480:PRINT@I,CHR$(128);:NE
XTI
270 PRINT@353,"select"R$"speed"R
$"from"R$"fast"R$"to"R$"slow";:G
OSUB290
280 GOTO300
290 W$="1 TO 9":C=112:L=422:GOSU
B1080:RETURN
300 X$=INKEY$:IFX$=""THEN300
310 X=ASC(X$):IFX<49THEN300
320 IFX>57THEN300
```





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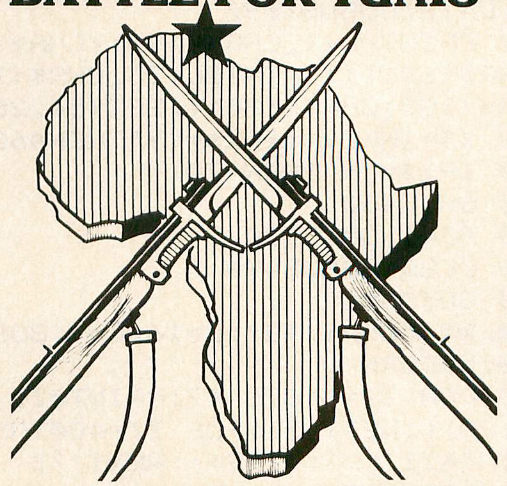

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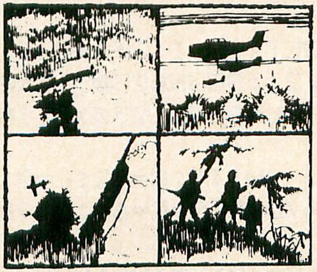

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```
330 K=VAL(X$):DL=K*8
340 CLS0:W$="SELECT":C=32:L=4:GO
SUB1080:W$="DESIRED":C=48:L=98:G
OSUB1080
350 W$="TABLES":C=16:L=196:GOSUB
1080:W$="FROM":C=64:L=296:GOSUB1
080:GOSUB290
360 X$=INKEY$:IFX$=""THEN360
370 X=ASC(X$):IFX<49THEN360
380 IFX>57THEN360
390 K=VAL(X$)
400 CLS0:W$="DO YOU":C=80:L=5:GO
SUB1080:W$="WANT THE":C=112:L=96
:GOSUB1080:W$="TABLES":L=196:C=6
4:GOSUB1080
410 W$="ASSORTED":C=32:L=288:GOS
UB1080:W$="Y ":C=16:L=386:GOSUB1
080:W$="OR ":C=0:GOSUB1080:W$="N
 ":C=16:GOSUB1080
420 PRINT@L+1,CHR$(190);CHR$(188
)CHR$(191);:PRINT@L+33,CHR$(128)
CHR$(188)CHR$(188);:SET(54,28,4)
430 X$=INKEY$:IFX$="Y"THEN460
440 IFX$="N"THEN470
450 GOTO430
460 AJ=1:GOTO470
470 CLS0:GOSUB490
480 GOTO500
490 W$="WHAT IS":C=16:L=3:GOSUB1
080:RETURN
500 FOR ZZ=416TO447:PRINT@ZZ,CHR
$(188);:NEXT ZZ:FOR ZZ=480TO510:
PRINT@ZZ,CHR$(179);:NEXT ZZ
510 POKE1535+MC,179
520 E=29:F=34:FORG=10TO24STEP2
530 FORI=E TO F:SET(I,G,5):NEXTI
540 SET(E-1,G+1,6):SET(F+1,G+1,6
)
550 E=E-1:F=F+1:NEXTG
560 FORI=12TO26:SET(31,I,3):SET(
32,I,3):NEXTI
570 PRINT@109,"times";:FOR TP=1T
O YS:NP=0:IF TR=>BR THEN970
580 F=RND(9):IF F=LN THEN580
590 IF AJ=0 THEN E=K
600 IF AJ=1 THEN E=RND(K)
610 LN=F:I=E+2:L=135:C=112:GOSUB
1260:I=F+2:L=151:GOSUB1260
620 AN=E*F:F$=STR$(AN)
630 FORI=1TO6:G=RND(9):H=RND(9):
H$=STR$(G*H):F$=F$+"    "+H$:NEX
TI
640 J$=LEFT$(F$,32)
650 PRINT@448,J$;
660 L$=RIGHT$(J$,31):M$=LEFT$(J$
,1):J$=L$+M$
670 FORP=1TO DL:NEXTP:IFTR=>BR T
HEN970
680 IFINKEY$=CHR$(32)THEN750
690 REM IF MC-10 DELETE LINE700
700 IFPEEK(339)=254THEN750
710 NP=NP+1:IFNP=150THEN730
720 GOTO650
730 PRINT@0,BB$;:W$="THINK":C=64
:L=6:GOSUB1080:SOUND1,2:SOUND1,2
:SOUND1,2
740 GOTO650
750 TR=TR+1:PRINT@431,CHR$(186)C
HR$(181);:PRINT@463,CHR$(138)CHR
$(133);
760 IF AN=VAL(MID$(J$,15,4))THEN
780
770 GOTO840
780 PRINT@0,BB$;
790 FORC=16TO112STEP32:W$="CORRE
CT":L=3:GOSUB1080:SOUNDC+1,1:NEX
TC
800 PRINT@0,BB$;:I=E+2:L=0:C=48:
GOSUB1260:I=4:C=32:GOSUB1310:I=F
+2:C=48:GOSUB1260
810 W$=" IS":C=16:GOSUB1080:W$=S
TR$(AN):C=32:GOSUB1080
820 GOSUB1360:PRINT@0,BB$;:GOSUB
490:CR=CR+1:NEXT TP
830 GOTO880
840 PRINT@0,BB$;:W$="WRONG":C=64
:L=6:GOSUB1080:SOUND20,1:SOUND2,
1:SOUND20,1:SOUND2,1
850 WR=WR+1:PRINT@0,BB$;:W$="TRY
":C=32:L=10:GOSUB1080:FORI=1TO30
0:NEXT:PRINT@0,BB$;:W$="AGAIN"
860 C=96:L=6:GOSUB1080:FORI=1TO3
00:NEXT:PRINT@0,BB$;:GOSUB490:IF
 NP>100THEN NP=0
870 GOTO650
880 IFTR<>YS THEN970
890 PRINT@0,BB$;:FOR JJ=448TO479
:PRINT@JJ,CHR$(159);:NEXTJJ
900 FORI=28TO10STEP-1:SET(31,I,2
):SET(32,I,2):SOUND230,1:NEXTI:F
ORI=1TO7:SET(30-I*2,10-I,2)
910 SET(33+I*2,10-I,2):SOUND230,
1:NEXTI:SET(30-I*2,11-I,2):SET(3
3+I*2,11-I,2)
920 FORI=1TO12:SET(13-I,2+I*2,2)
:SET(50+I,2+I*2,2):SOUND230,1:NE
XTI:FORI=1TO20:SOUNDRND(230),1:N
EXT
930 CLS0:W$="YOU  HIT":C=32:L=2:
GOSUB1080:W$="PAYDIRT":C=64:L=98
:GOSUB1080
940 W$="WITH A":C=48:L=196:GOSUB
1080:W$="PERFECT":C=16:L=290:GOS
UB1080
950 W$="SCORE":C=112:L=390:GOSUB
1080
```

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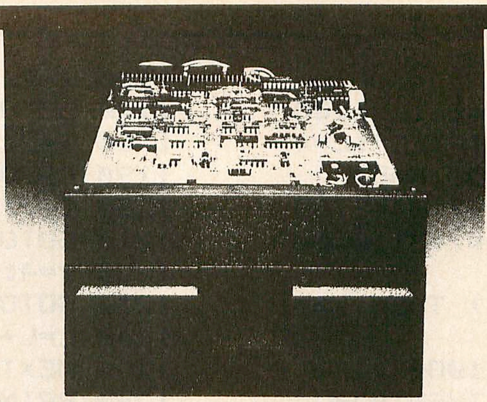

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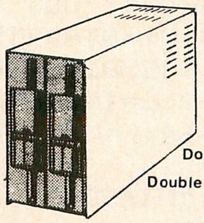

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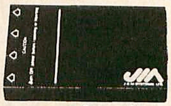

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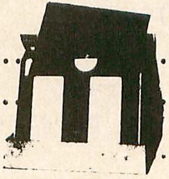

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```
960 GOSUB1360
970 CLS0:W$="OUT OF":C=16:L=6:GO
SUB1080:W$=STR$(TR)+" TRIES":C=4
8:L=96:GOSUB1080:W$="YOU HAD"
980 C=32:L=196:GOSUB1080:W$=STR$
(WR):C=64:L=307-(LEN(W$)*3):GOSU
B1080
990 W$="MISSES":IF WR=1 THEN W$=
"  MISS"
1000 C=112:L=388:GOSUB1080
1010 IFINKEY$=CHR$(13)THEN1030
1020 GOTO1010
1030 PRINT@483,"press"R$"enter"R
$"for"R$"another"R$"try";
1040 FORI=1TO1000:NEXT
1050 IFINKEY$=CHR$(13)THEN1070
1060 GOTO1050
1070 RUN
1080 P=LEN(W$):FORZ=1TOP:I=ASC(M
ID$(W$,Z,1))-46
1090 IFI=31THEN1160
1100 IFI=32THEN1180
1110 IFI=41THEN1200
1120 IFI=42THEN1220
1130 IFI=-14THEN1240
1140 GOSUB1260
1150 GOTO1250
1160 I=1:GOSUB1310
1170 GOTO1250
1180 I=2:GOSUB1310
1190 GOTO1250
1200 I=3:GOSUB1310
1210 GOTO1250
1220 I=4:GOSUB1310
1230 GOTO1250
1240 L=L+2
1250 NEXT:RETURN
1260 PRINT@0+L,CHR$(A(I,1)+C)CHR
$(A(I,2)+C)CHR$(A(I,3)+C);
1270 PRINT@32+L,CHR$(A(I,4)+C)CH
R$(A(I,5)+C)CHR$(A(I,6)+C);
1280 PRINT@64+L,CHR$(A(I,7)+C)CH
R$(A(I,8)+C)CHR$(A(I,9)+C);
1290 L=L+4:RETURN
1300 GOTO1300
1310 PRINT@0+L,CHR$(B(I,1)+C)CHR
$(B(I,2)+C)CHR$(B(I,3)+C)CHR$(B(
I,4)+C);
1320 PRINT@32+L,CHR$(B(I,5)+C)CH
R$(B(I,6)+C)CHR$(B(I,7)+C)CHR$(B
(I,8)+C);
1330 PRINT@64+L,CHR$(B(I,9)+C)CH
R$(B(I,10)+C)CHR$(B(I,11)+C)CHR$
(B(I,12)+C);:L=L+5:RETURN
1340 PRINT@Q,CHR$(154);:PRINT@Q+
30,CHR$(145)CHR$(128)CHR$(154)CH
R$(145);
1350 PRINT@Q+63,CHR$(153)CHR$(15
5)CHR$(152);:PRINT@Q+96,CHR$(152
);:RETURN
1360 FORI=1TO1500:TU=RND(9999)
1370 REM MC-10 DELETE LINE1380
1380 IFPEEK(339)=254THEN1400
1390 IFINKEY$=""THENNEXT
1400 RETURN
2000 DATA 135,140,139,143,128,14
3,132,140,136
2010 DATA 129,143,128,128,143,12
8,132,140,136
2020 DATA 142,140,139,131,140,12
9,140,140,140
2030 DATA 140,140,139,140,140,14
3,140,140,136
2040 DATA 143,133,138,140,141,14
2,128,132,136
2050 DATA 143,140,140,140,140,14
3,140,140,140
2060 DATA 143,140,140,143,140,14
3,140,140,140
2070 DATA 142,140,143,128,135,13
6,132,136,128
2080 DATA 143,140,143,143,140,14
3,140,140,140
2090 DATA 143,140,143,140,140,14
3,140,140,140
```

Your 64k CoCo has up to 88k of memory
You have 64k of RAM and 24k of ROM
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this machine language program

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```
2100 DATA 135,140,139,143,140,14
3,140,128,140
2110 DATA 143,140,139,143,140,13
9,140,140,136
2120 DATA 143,140,140,143,128,12
8,140,140,140
2130 DATA 143,140,139,143,128,14
3,140,140,136
2140 DATA 143,140,140,143,140,14
0,140,140,140
2150 DATA 143,140,140,143,140,14
0,140,128,128
2160 DATA 143,140,140,143,132,14
3,140,140,140
2170 DATA 143,128,143,143,140,14
3,140,128,140
2180 DATA 132,143,136,128,143,12
8,132,140,136
2190 DATA 140,141,142,128,133,13
8,140,140,136
2200 DATA 143,129,142,143,141,13
0,140,128,140
2210 DATA 143,128,128,143,128,12
8,140,140,140
2220 DATA,,,,,,,,,,,,,,,,,,
2230 DATA 143,140,143,143,128,14
3,140,140,140
2240 DATA 143,140,143,143,140,14
0,140,128,128
2250 DATA 143,140,143,143,129,14
3,140,140,142
2260 DATA 143,140,143,143,141,13
0,140,128,140
2270 DATA 143,140,140,140,140,14
3,140,140,140
2280 DATA 140,143,140,128,143,12
8,128,140,128
2290 DATA 143,128,143,143,128,14
3,140,140,140
2300 DATA 139,128,135,141,131,14
2,128,140,128
2310 DATA,,,,,,,,,,,,,,,,,,
2320 DATA 139,128,135,132,143,13
6,128,140,128
2330 DATA 140,140,143,131,140,12
8,140,140,140
2340 DATA 143,130,129,143,143,13
2,136,143,140,128,128,140
2350 DATA 143,139,128,143,143,13
2,139,143,140,128,132,140
2360 DATA 143,128,128,143,143,13
4,137,143,132,136,132,136
2370 DATA 141,130,129,142,129,13
4,137,130,140,128,128,140
```

BASIC COMPILER

Create Machine Language Programs from Basic Programs

Thats right, with this powerful integer Compiler, called INTBASIC, one can translate Basic programs to Machine Language. Those who do not want to learn Assembly Language can use this utility program to create those fast machine language programs every ambitious programmer dreams of creating. Even fully compitant Assembly Language programmers will find INTBASIC a very valuable utility. INTBASIC was designed specifically to produce efficient 6809 machine code by utilizing the powerful instruction set available.

INTBASIC, developed by WASATCHWARE, features all standard Basic command words including two-dimensional arrays, multiple commands per line and strings. In addition, INTBASIC offers commands that are not available with Color or Extended Color Basic. All 64k of RAM can be used for program storage and/or variable storage, and all 32k of ROM can be accessed within the m.l. program. Compiled programs can be called from a Basic program, thus making interfacing easy.

INTBASIC has many features that some of the lower priced Basic Compilers can't offer. Here are just some of them:

-No Disk system is required, although it can run from disk
-Extended Color Basic is NOT required
-Enables the full 64k of RAM to be used
-16k machines can run INTBASIC

In addition, INTBASIC is written in Machine language, not Basic. This means that compile times are very short. How short? INTBASIC can compile a 10 thousand byte Machine Language program in as little as 30 seconds!

Some other reasons to buy INTBASIC

-By converting Basic programs to machine language, program execution times are decreased by a factor of 50!

-Machine Language programs can perform many things that a Basic program cannot do. Unlimited possibilities exist when using machine language.

-Variable storage is efficiently allocated, and therefore large arrays may be used. For example, the integer array A(30000) is allowable on 64k machines.

-More than one program can reside in memory at once. As apposed to Basic which only allows one program at a time in the computer.

-System utility software can be easily developed using INTBASIC.

-Machine language programs that take pages and pages of Assembly Language source to create, can be created with less than a page of a comparable Basic source, when compiled with INTBASIC.

-Versions for 16,32 and 64k computers are all included for the same low price.

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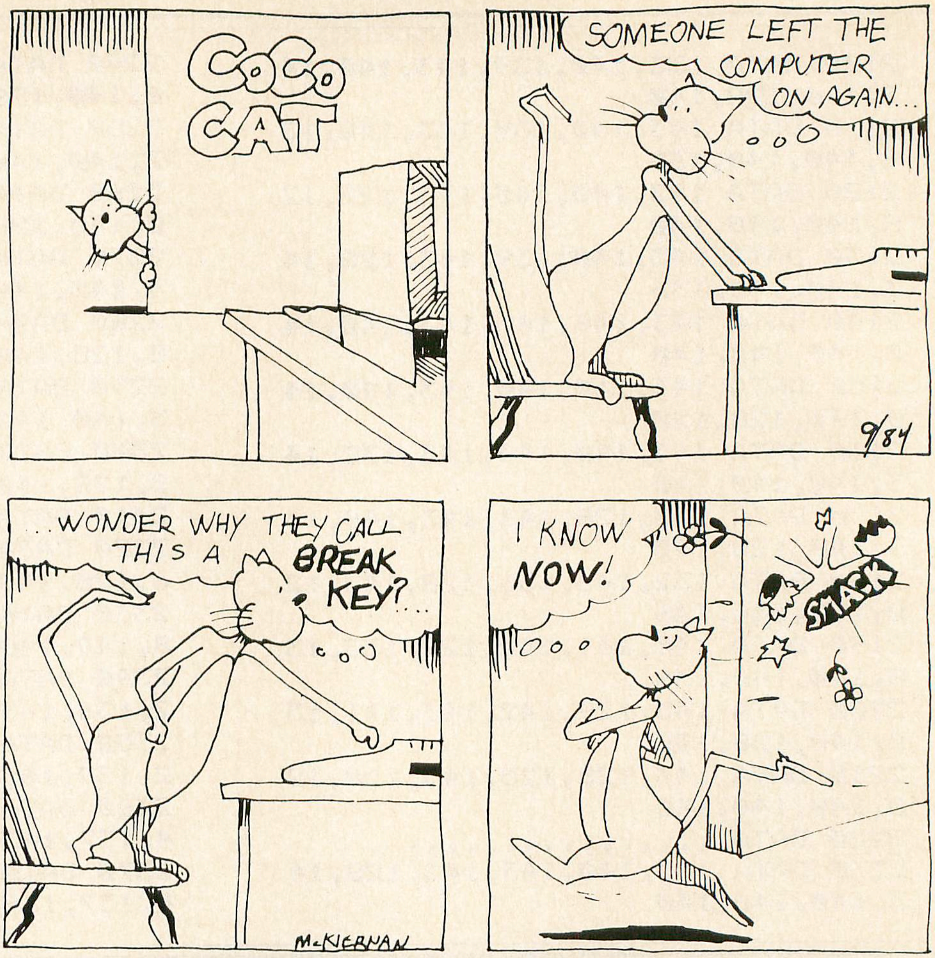
CORRECTIONS

In "The Arconiax Assignment" on Page 90 of the July issue, the 16K version is just a bit too large to run in a 16K machine. Eric Tilenius tells us that the fix is to type *POKE 25,6:NEW* before loading, then delete Lines 10, 20, 30 and 1590 and change Line 40 to read *CLEAR 600.* You also will need to *POKE 25,6: NEW* before loading the new version.

In "Cooking With CoCo" on Page 170 of the August issue, the schematic diagrams for the EPROM programmer were left out. You can find them in Part III of the series on Page 78 of this issue.


CoCo CAT
SOMEONE LEFT THE COMPUTER ON AGAIN...
ooo
9/84
...WONDER WHY THEY CALL THIS A BREAK KEY?...
ooo
I KNOW NOW!
ooo
SMACK
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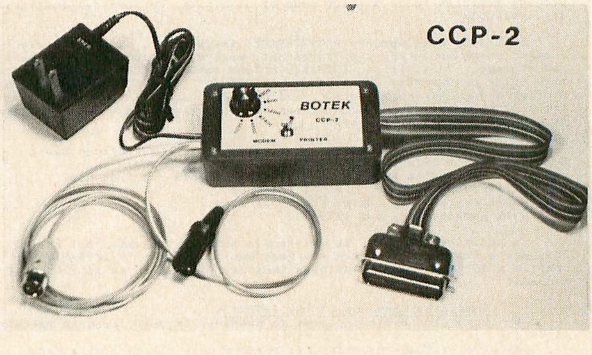

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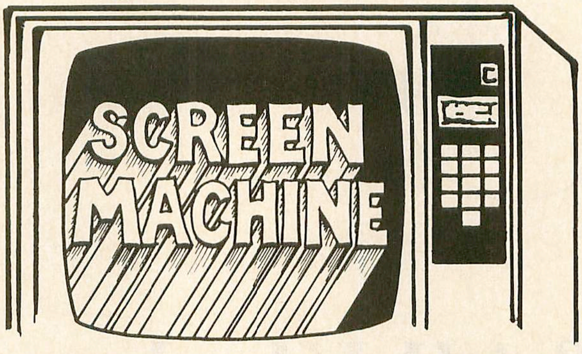
Sugar Software



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RAINBOW SCREEN MACHINE

SUPER SCREEN MACHINE

- **The Rolls Royce of graphics/text screen enhancers — more screen features than all others combined!**
- Add these features to your computer/program: ML extension of Basic loads on top of 16, 32, or 64K machines to enable easy mixture of **hi-res graphics and text** in your programs. Dense text or large lettering for children, visually impaired or VCR title screens with no programming!
- User definable 224 character set featuring lower case descenders, Greek, cars, tank, planes, etc., completely interfaced with **all keys, commands, and PMODES.** 12 sizes (most colored) from 16 x 8 to **64 x 24. PRINT @, TAB and comma fields are fully supported.**
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- Simple 2-letter abbreviated commands inside your program or **control key** entry from keyboard, even during program execution!
- Includes demo program, **character generator** program and manual. 16K Ext. Basic required — 32K recommended. **$29.95 Tape; $32.95 Disk.**

Screen Machine can be used in games, word processors, utilities, etc. In addition, the custom graphics characters can be used to develop easy, effective hi-res character-graphics programs. The potential is truly unlimited.

Screen Machine can be used to directly create video recorder title screens or large lettering for children or the visually impaired simply by typing.

- **Revolutionary — heralded as the most useful, powerful and versatile state-of-the-art utility ever developed for the Color Computer!**
- All of the features of Screen Machine and more:
- Variable **SMOOTH Scroll** for professional displays, listings, business use.
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- **Superpatch + command** for instant compatibility with the Superpatch + Editor-assembler
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- Dynamic **Screen Dump command** for use with Custom Software Engineering's Graphic Screen Print program for simple printer "Snapshots" of your screen even during program execution!
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Screen Machine is fully interfaced with all keys and commands. Although some Basic programming knowledge is recommended just a few minutes spent studying and referencing your computer's Basic manuals will turn you on to the power of computing with Screen Machine.

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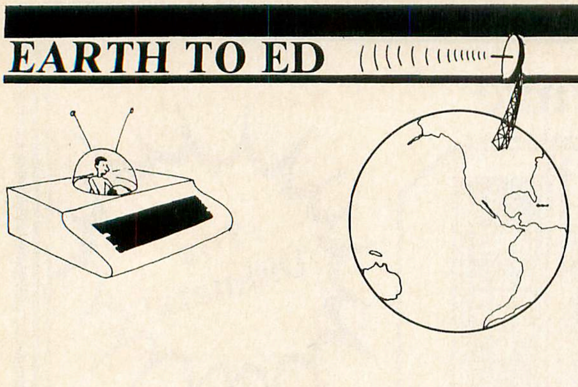


Chips Of All Kinds

By Ed Ellers
Rainbow Technical Writer

• *I have several questions about chips for the CoCo.*

1) What is the difference between a 6821 PIA and a 6822 IIA?

2) What is the difference between a SAM chip with a heat sink and one without?

3) Is the 6847 capable of making sprite graphics as in the Commodore 64; if not, is there any way of doing something similar?

4) Where can I buy a 68B09E chip?

Brian Lasher
Burke, VA

First, the difference between the 6821 and 6822 is the acceptable load on the parallel ports; the 6822 Industrial Interface Adapter is designed for heavier loads. For some reason, the newer CoCo keyboards require a 6822 instead of the 6821 to work reliably. As to the SAM chip, there is no such thing as a SAM with a built-in heat sink; what you are probably thinking of is a SAM chip that has had a heat sink attached. One of our advertisers is selling these as replacements for SAM chips burned out from heat.

The 6847 video generator used in the CoCo does not have sprite graphics capability (which means that objects can be defined and then positioned over the graphics screen easily), but the CoCo's graphics are so fast that similar effects are possible simply by redrawing portions of the graphics screen. Unfortunately, this must be done in machine language because BASIC has no statements to generate such effects. (You might be interested to know that Apple's new Macintosh doesn't have sprites either; all that fast action is done by redrawing portions of the screen, just as many CoCo programs do.)

Finally, the less common Motorola chips such as the 68B09E can be bought through an industrial electronics distributor that handles the Motorola Semiconductor line; look in the Yellow Pages under "Electronics — Whol & Mfrs," because some distributors advertise in the Yellow Pages over a wide region.

(Ed Ellers, a RAINBOW *and* PCM *staff member, is a self-confessed electronics fanatic whose other interests include science fiction.)*

The 220/120 Connection

• *I read with interest the letter from Charles A. Marcotte in the June issue (about operating the CoCo on 220 volt/50 Hz European power lines). Last year I faced the same problem. I wrote a letter to Radio Shack's Customer Service department requesting information. Both the answer I got from them and what you told Mr. Marcotte are misleading. Replacing the CoCo's transformer is not only unnecessary, it is a waste of money. I brought my system to Europe just as I was operating it in the US. The only thing I had to do was purchase a step-down transformer for $20. I'm now operating a CoCo, one drive, a cassette recorder and a DMP-400 printer on a 300-watt transformer. The system has been operating for seven months with no problems. I know several people here who have different systems, and all of them are using step-down transformers.*

Rodney McDaniel
APO New York

I still stand by what I said before. A transformer intended for use with a particular product at 60 Hz will operate much less efficiently at 50 Hz; the lost energy shows up as heat, and the transformer is very likely to overheat. The amount of heat will depend on how "over-rated" the transformer is for the device it's in. If you do operate 60 Hz equipment on 50 Hz, keep close watch on the temperature near the power transformer.

Multi-Pak Problems

• *I am really puzzled by a couple of problems related to the Multi-Pak Interface, and I hope you can enlighten me.*

Prior to adding the interface, the speed-up POKE (POKE 65495,0) *worked properly. Now with the disk controller in slot 4, the speed-up poke will not work. When it is attempted, the screen is filled with garbage and the computer locks up. Removing the interface and plugging the controller directly into the computer still allows the* POKE *to work.*

With the Multi-Pak connected, I notice that when the interface is switched on (with the computer still off) the light on drive 1 goes on. When the computer is turned on, the light goes off and all is normal. What gives?

Hilton Wasserman
Little Neck, NY

The reason that the high-speed *POKE* doesn't work is probably the big change that the Multi-Pak makes in the way the controller connects to the CoCo. Without the interface, the controller connects directly to the CPU (and I do mean directly; the pins on the cartridge connector run straight to the CPU without any buffering). With the Multi-Pak, there are buffers and slot-selection logic in between, plus the somewhat longer electrical path. Remember that the CoCo is not intended to be operated at high speed (it is a feature of the SAM chip that Radio Shack does not support); the Multi-Pak Interface was designed for normal speed operation only. As for the disk drive light, when you switch on the Multi-Pak its power supply provides power for the controller and cartridges; since the computer is turned off, the address and data lines are not properly terminated and the controller is probably getting false signals.

What's Under The Hood?

- *Is the new disk drive that Radio Shack sells for the CoCo 2 (in a white case) a 35-track or 40-track drive? I have a 40-track Tandon drive with the J&M controller, and have JDOS both on disk (version 1.06) and in ROM (1.09). When I tried JDOS on two CoCo 2 systems with the new drives, they both worked properly at 40 tracks. Does this mean that the new drive is a 40-track unit and Radio Shack isn't saying anything because Disk BASIC can't handle 40 tracks?*

Robert Sloan
Johnstown, PA

Yes, it's true that the new drives are capable of 40-track operation; it's also true that Disk BASIC is designed for use with the old 35-track drives. The new CoCo drives are made by Texas Peripherals, a joint venture of Tandy and Datapoint, and are the same as the drives sold for the Model 4. (In fact, a new drive that one of my colleagues here at THE RAINBOW bought had a Model I/III/4 drive label on the front instead of the CoCo drive nameplate!) These drives are very similar to Tandon drives and are capable of the same 6-ms step rate. Radio Shack is following its usual policy of advertising only what its products can do with the software that they offer. They didn't mention the CoCo's 64K capability until OS-9 came out because none of their software used 64K; they advertised the Model I's drives for a long time as 35-track single-density even though nearly all the drives they sold were made for double density, and many were 40-track. This practice is in sharp contrast to that of companies who talk about products and features that aren't out yet or aren't available from them.

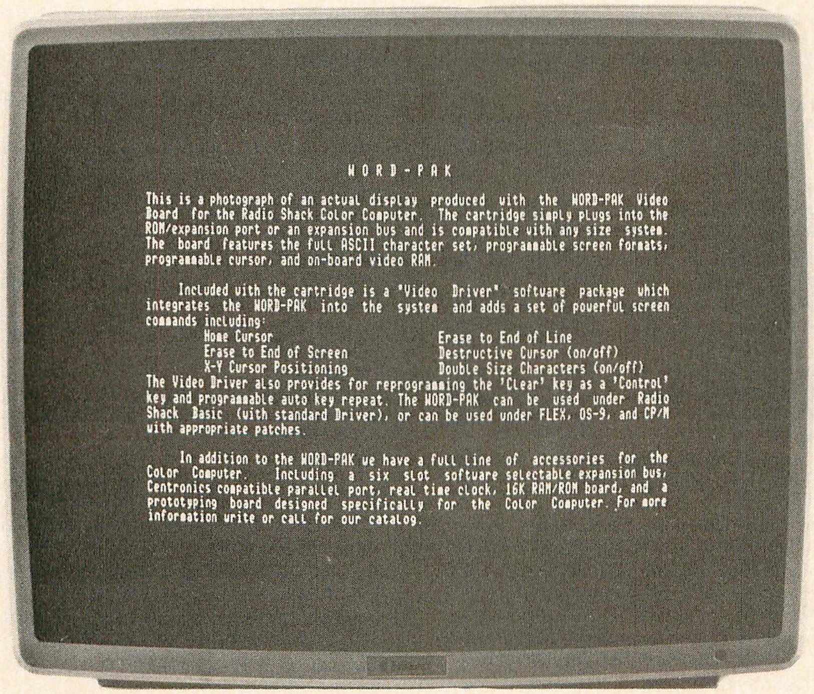
Which Drive Is Which?

- *I have a Radio Shack drive 0 and a Tandon drive 1. Will you please tell me what I need to do to reverse them (use the Tandon as drive 0 and the Radio Shack drive as 1)?*

Bob Owen
Wilmington, NC

If you bought the Radio Shack drive as drive 0 (with a cable and controller), you should be using it as drive 1! Just switch them around; hook up the Tandon as the left-hand drive and the Radio Shack as the right hand drive. That's all you need to do. The reason is that a drive 0 unit contains a special resistor pack that terminates the control lines. The drive with the resistors installed should be the last drive on the cable (drive 1 in a two-drive system) so as to terminate after the other drives and not before. With the short distance between drives in the CoCo, this is not critical. The selection of which drive corresponds to which device number is made by removing pins from the drive cable (at the factory); this is arranged so that when the drive select signal goes out it is received only by the drive it is intended for. Unlike some other systems, with the CoCo, the drives themselves play no role in the drive selection process.

A PICTURE IS WORTH . . .



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                         W O R D - P A K

This is a photograph of an actual display  produced  with  the  WORD-PAK  Video
Board  for the Radio Shack Color Computer.  The cartridge simply plugs into the
ROM/expansion port or an expansion bus and is compatible with any size  system.
The  board  features the full ASCII character set, programmable screen formats,
programmable cursor, and on-board video RAM.

     Included with the cartridge is a "Video  Driver"  software  package  which
integrates  the  WORD-PAK  into  the  system  and adds a set of powerful screen
commands including:
        Home Cursor                          Erase to End of Line
        Erase to End of Screen               Destructive Cursor (on/off)
        X-Y Cursor Positioning               Double Size Characters (on/off)
The Video Driver also provides for reprogramming the 'Clear' key as a 'Control'
key and programmable auto key repeat. The WORD-PAK  can  be  used  under  Radio
Shack  Basic  (with standard Driver), or can be used under FLEX, OS-9, and CP/M
with appropriate patches.

     In addition to the WORD-PAK we have a full line  of  accessories  for  the
Color  Computer.   Including  a  six  slot  software selectable expansion bus,
Centronics compatible parallel port, real time clock, 16K RAM/ROM board, and  a
prototyping  board  designed  specifically  for  the  Color  Computer. For more
information write or call for our catalog.
```

PBJ inc.
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(201) 330-1898

CoCo Community

We have compiled a list of Color Computer Clubs because of the many requests we have received. CoCo Clubs may wish to exchange newsletters, share ideas for topics of discussion at monthly meetings, etc.

Please let us know if we have omitted any clubs and send us complete up-to-date addresses. Only those clubs which have signed our "agreement form" will appear in this listing of CoCo Clubs. Also, please notify us if you wish to add or delete any names on this list. Send your information to:

CoCo Clubs
THE RAINBOW
9529 U.S. Highway 42
P.O. Box 385
Prospect, KY 40059

ALABAMA

Birmingham Alabama Color Computer Club, Robert Matthews, 1725 14th Ave. S., Birmingham, 35205, (205) 933-0887

Huntsville Color-80 Users Group, Randy Niemann, 1011 Versailles Dr., S.E., Huntsville, 35803, (205) 882-2485

ALASKA

Alaska Color Computer Users' Group, Rick McDannel, 430C Beluga Ave., Ft. Richardson, 99505, (907) 428-0392

ARIZONA

Tucson Color Computer Club, William H. Nunn, 6857 A Lighting Circle #22, Tucson, 85708

ARKANSAS

Central Arkansas CoCo Club, Melinda Braslovsky, 1203 Erving Rdg., LP Cabot, 72023, (501) 982-8854

CALIFORNIA

CoCo Nutz Computer Club, Walter V. Seay, 68-461 Highway 86, Thermal, 92274, (619) 397-4252

Citrus Color Computer Club, Joseph Kohn, P.O. Box 6991, San Bernadino, 92412, (714) 792-8721

Joe Bennett, 1169 Florida Street, Imperial Beach, 92023, (474-6213)

The Davis CoCoNuts, Adam Sherman, 1818 Haussler Dr., Davis, 95616, (916) 758-3195

Local Color—A CoCo Club of San Francisco, Andrew G. Kieval, P.O. Box 421242, San Francisco, 94142

Color America Users Group, Mark Randall, 2227 Canyon Rd., Arcadia, 91006, (213) 355-6111

Los Angeles-Wilshire Color Computer Users' Group,c/o Norm Wolfe, 269 S. Lafayette Park Pl., Los Angeles, 90057

Sacramento Color Computer Club, Wayne Chrisope, P.O. Box 9, Elverta, 95626

Sacramento CoCo Club, Charles Doughty, Box 60511, Sacramento, 95860

San Joaquin CoCo Club, Steven Paul Moreno, P.O. Box 99024, Stockton, 95209, (209) 951-3938

Salinas Color Computer Club, Larry Livingston, 501 Monterey Highway, Salinas, 93908, (408) 484-9697

Silicon Valley Color Computer Club, Shawn Jipp, P.O. Box 61593, Sunnyvale, 94088, (408) 749-1947

South Bay Color Computer Club, Karen Schlotzhauer, 2545 W. 255th Place, Torrance, 90505, (213) 539-2439

Ventura County Color Computer Club (VC4), c/o Pete Lydall, Oxnard Public Library, 214 "C" Street,Oxnard, 93030, (805) 984-1842 or DATA (805) 984-1842

COLORADO

Lowry Microcomputer Club/CoCo Users' Group, Jerry D. Surritte, 2249 Moline St., Aurora, 80010, (303) 343-3273

FLORIDA

Broward CoCo Club, Sue Spahn, 11950 N.W. 29th Manor, Sunrise, 33582, (305) 741-4737

C.C. Club of Sarasota, Ernie Bontrager, 4047 Bee Ridge Rd., Sarasota, 33582, (813)921-7510

Jacksonville Color Computer Club, William H. Brown III, 2411 Hirsch Ave., Jacksonville, 32216, (904) 721-0282

Northwest Florida CoCo Nuts, William N. Lamb, P.O. Box 1032, Fort Walton Beach, 32549, (904) 244-5281

ILLINOIS

Cook County Color Computer Club, Tim Powers, 1633 Fifth Ave., Chicago Heights, 60411, (312) 747-7062

Glenside Color Computer Club, Chuck Roberg, 521 Canyon, Carol Stream, 60188, (312) 690-9374

Motorola Microcomputer Club, Steve Adler, 1301 Algonquin Rd., Schaumburg, 60196, (312) 576-3044

Northern Illinois Color Computer Club, 580 Milton Lane, Hoffman Estates, 60194, (312) 885-2573

Town & Country CoCo, 5461 S. Kenwood, Chicago, (312) 493-3748

INDIANA

Indy Color Computer Club, Mike Davis, P.O. Box 68702, Indianapolis, 46268, (317) 257-3300

Southern Indiana Computer Club, Route 1, Box 459, Mitchell, 47446

Three Rivers Users Group, Russ Garner, 533 Villa Park Ct., Fort Wayne, 46808

IOWA

Iowa City TRS-80 Users Group, Susan Chapler, R.R. 6, The Woods, Iowa City, 52240, (319) 351-5959

Metro Area Color Computer Club, K.L. Knudtzon, 3324 11th Ave., Council Bluffs, 51501

KANSAS

Kansas City CoCo Club, Mike Allinder, P.O. Box 11192, Kansas City, 66111, (913) 287-1904

Topeka Color Computer Club, Kevin Cronister, 2224 Hope, Topeka, 66614, (913) 272-1353

Walnut Valley C.C. Users Club, David Anderson, 1212 E. 4th St., Winfield, 67156, (316) 221-0040

KENTUCKY

LOCO-COCO, Mike Standefer, 3141 Doreen Way, Louisville, 40220, (502) 458-6690

LOUISIANA

Cajun CoCo Club, Bob Hoevel, 104 Karen St., New Iberia, 70560, (318) 365-7706

Red Stick Color Computer Club, Gary Cash, 8929 Metairie Drive, Baton Rouge, 70810, (504) 293-7799

MASSACHUSETTS

Greater Boston Super Color Users Group, Robert Biamonte, 6 Boulder Drive, Burlington, 01803

New England C.C. Users Group, Christopher E. Sweet, P.O. Box 255, Harvard, 01451, (617) 456-8291

Massachusetts CoCo Club, Jason Rahaim, Spring St., Lunenberg, 01462, (617) 582-6514

6809'ers, Paris Nepus, 93 Grochmal Ave., #90, Springfield, 01151, (413) 732-6633

MICHIGAN

Greg Miller, P.O. Box 365, Haslett

Midland C.C. Club, Neil Drake, 709 Coolidge, Midland, 48640, (517) 631-2939

Michiana CoCo Club, Clay Howe, 310 S. Jefferson St., Sturgis, 49091, (616) 651-4248

Petoskey Area CoCo Club (PAC^3), Dennis Hoshield, 670 Liegl Drive, Alanson, 49706, (616) 347-0607

MISSISSIPPI

Singing River C.C. Club, Henry Nielsen, 9001 Gray Ave., Ocean Spring, 39564

MISSOURI

Mid-America Color Computer User's Group, Jerry Morgon, 807 Ponca Drive, Independence, 64056, (816) 796-5813

North County 80 Group, Tom Vogel, 12 Ville Donna Ct., Hazelwood, 63042, (314) 739-4078

MONTANA

Billings C.C. Club, Jayne Kenyon, 4306 Phillip, Billings, 59101

NEW JERSEY

Bug 80 Users' Group, George R. Miller, Jr., Box 62, Glen Gardner, 08826

Loco CoCo Club, Bud Lavin, 73B Wavercrest Ave., Winfield Park, 07036

NEW MEXICO

Chaves County Color Computer Club, Lee Mitchell, 1102 Melrose Drive, Roswell, 88201, (505) 623-0789

NEW YORK

Adirondack CoCo Club, Bill Edwards, Box 365, Bolton Landing, 12814, (518) 644-9927

Broome CoCo Club, Bucky Helmer, 57 Front St., Binghampton, 13905

C.C. Club of Central N.Y., Joseph Short, 248 S. Fourth Ave., Ilion, 11357, (315) 895-7730

Kings Byte CoCo Club, Morty Libowitz, 1063 East 84th St., Brooklyn, 11236, (212) 763-4233

Local CoCo, Charles Martin, P.O. Box 901, Bellmore, 11710

Queensboro Color Computer Club, Bob Rosen, Springfield Blvd. & 56th Ave., Bayside, 11364, (212) 631-6233

NORTH CAROLINA

TRS-80 Users' Group of Charlotte, Jason Foodman, 240 Medearis Dr., Charlotte, 28211

Raleigh Color Computer Club, David Roper, P.O. Box 681, Garner, 27529

OHIO

CoCo Club of Youngstown, Timothy McFadden, P.O. Box 478, Canfield, 44406, (216) 788-4218

Columbus & Central Ohio Color Computer Club, D.E. Sparrow, 19 E.N. Broadway, Columbus, 43214, (614) 268-5366

Cincinnati TRS-80 Users Group, R.A. White, 44 Dow Court, Fairfield, 45014

Dayton Area Color Computer Users Group, David R. Barr, 2278 Yorkshire Pl., Kettering, 45419, (513) 293-2228

Dayton CoCo Users' Group, Joseph P. Evans, 609 Applehill Dr., W. Carrollton, 45449

Miami Valley CoCo Club, R. Douglas Wales, 2065 Le Feure Rd., Troy, 45373

M.U.G. of CoCo—Middletown Users Group, James Carr, Middletown, 45042, (513) 424-6905

Northeastern Ohio (N.E.O.) CoCo Club, Tony Rugue, 527 Malvern Drive, Painsville, 44077, (216) 354-2736

The Cleveland CoConuts, Paul Selig, 20734, Stanford Ave., Fairview Park, 44126, 333-2920

OREGON

Willamette Valley CoCo Users, Brian James, P.O. Box 11468, Eugene, 97440, (503) 687-9286

PENNSYLVANIA

Capital Area TRS-80 Users Group, David Morrow, 340 Lewisberry Rd., New Cumberland, 17070, BBS (717) 774-6543

HUG-A-CoCo, George Lurie, 2012 Mill Plain Court, Harrisburg, 17110, (717) 657-2789

Penn-Jersey Color Computer Club, P.O. Box 2742, Lehigh Valley, 18001

Pittsburgh Color Group, William Tucker, P.O. Box 351, West Mifflin, 15122, (412) 466-3078

RHODE ISLAND

New England CoCo Nuts, P.O. Box 6604, Providence, 02940

SOUTH CAROLINA

Hilton Head Island CoCo Club, Kevin Clark, P.O. Box 6187, Hilton Head Island, 29928, (803) 785-9630

Metropolitan Greenville CoCo Club, Ed Lowe, P.O. Box 6, Gray Court, 29645, (803) 876-3928

Midlands 80 Computer Club, Tommy Sanders, P.O. Box 7594, Columbia, 29202, BBS (803) 755-3414

Spartanburg County CoCo Club, Dennis Shattuck, 473 Royal Oak Drive, Spartanburg, 29302, (803) 583-3017

TENNESSEE

Chattanooga CoCo Club, Jim Perkins/Jim Cox, P.O. Box 9825, Chattanooga, 37412, (615) 870-2439

Memphis Color Computer Users' Group, Ben Barton, 4903 Warrington Rd., Memphis, 38118, (901) 795-7075 or 362-5945

TEXAS

B/CS Color Computer Users' Group, Dale Cuthbertson, 1812 Michael Lane, Bryan, 77801, (409) 822-0731

CoCo User Group, David Karam, 1809 Dexter, Austin, 78704, (512) 442-6317

Deer Park Color Computer Club, Donald Burr, 4314 W. Grant, Deer Park, 77536, (713) 479-5313

International Color Computer Club, Inc., Ronald L. Garrett, 2101 East Main Street, Henderson, 75652, (214) 657-7834

UTAH

Ogden CoCo, Kathy Rush, 4535 S. 2600 W. Roy, Ogden, 84067

Small Computers Users Assoc. of Utah, Eldon Griffiths, 3828 S. Bills Dr., West Valley City, 84120

VIRGINIA

Central Virginia Color Computer Club, Lane Lester, 413 Woodland Circle, Lynchburg, 24502, (804) 237-4188

D.C./N. Va. C.C. Club, Jack Darling, 43 Donovan Dr., Alexandria, 22306, (703) 780-6159

Northern Virginia C.C. Club, Logan McMinn, 6048 Belleview Dr., Apt. 1, Falls Church, 22041

WASHINGTON

Northwest Computer Club, Judy Gehman, E. 14012 Cataldo, Spokane, 99216, (509) 928-2169

WEST VIRGINIA

Blennerhassett CoCo Club, David Greathouse, Rt. 9, Box 119, Parkersburg, 26101

Kanawha Valley Personal Computer Club, Robert L. Vaughn, 1223 Ridge Drive, S. Charleston, 25309, B.B.S. (304) 925-3338 or B.B.S. (304) 345-8280

Mtn. State CoCo Users Group, Donald G. Barber, Jr., P.O. Box 1084, Morgantown 26507, (304) 599-4493

Mil-O-Bar C.C. Club, Jim Lemaster, Ona, 25545, (304) 743-4752

West Virginia Color Computer Club, William Mucklow, 949 Baier Street, St. Albans, 25177, (304) 727-6764

WISCONSIN

CoCo-MUG, Tom Fandre, P.O. Box 10152, Milwaukee, 53210, (414) 542-0600

Southern Wisconsin CoCo Club, David C. Buehn, P.O. Box 411, Twin Lakes, 53181

CANADA

ALBERTA

Calgary Color Computer Club, David Logan, 151 Whitelock Place N.E., Calgary, T1Y 4S7

Medley Computer and Electronics Club, P.O. Box 1267, Medley, T4A 2M0

NEW BRUNSWICK

Color Computer Moncton Users Group (CoCo MUG), Leo Allain, 91 Woodland Drive, Moncton, E1E 3C4

BRITISH COLUMBIA

North Island CoCo Club, Brian Marshall, P.O. Box 1740, Port Hardy, B.C., V0N 2P0

NEWFOUNDLAND

Avalon CoCo Club, A.R. Thompson, 10 Foran Street, St. John's, A1E 4G1

NOVA SCOTIA

Halifax Dartmouth CoCo Users Group, P.O. Box 572, Dartmouth, B2Y 3Y9, (902) 469-3656

ONTARIO

International Adventurer's Club, Maurice Dow, 84 Camberley Cres., Brampton, L6V 344

K-W C.C. Club, Peter Karwowski, 23 Hudson Crescent, Kitchener, N2B 2V7

London CoCo Nuts Computer Club, Harry K. Boyce, 180 Concord Road, London, N6G 3H8, (519) 472-7706

Meadowvale Color Computer Club, Howard Porter, P.O. Box 186, Streetsville, Mississauga, L5M 2B8

Niagara Regional CoCo Club, Harry VanDyke, 7707 Jubilee Drive, Niagra Falls, L2G 7J3

QUEBEC

Montreal TRS-80 Users Group, Jacobus P.C. Bagchus, 1176 Phillips Place, Suite 201, Montreal, H3B 3C8, (514) 861-3488

South Shore CoCo Club, Jacques Bedard, 33 Lisilre, St-Constant, P.Q., J0L 1X0

SASKATCHEWAN

Regina Color Computer Club, Georges Glass, 26 Tweedsmuir Bay, Regina, S4X 2B1, (306) 949-3942

Saskatoon Color Computer Club, Guy Tomashewski, 415-423 Pendygrasse Rd., Saskatoon, S7M 4Z2

AUSTRALIA

Blacktown City Colour Computer Users Group, Keith Gallagher, 27 Alford St., Blacktown, New South Wales, 2148

CoCo Colyteens of Colyton, Dwayne Manson, P.O. Box 506, St. Marys, New South Wales, 2760

MEXICO

Mexico City Color Computer Club, Marcelo Luft, Laja #232, 01900 Mexico D.F., Mexico City, 5-68-78-75

WEST GERMANY

First CoCo Club Hamburg, Theis Klauberg, 2000 Hamburg 62, Bultenmoor 43

new clubs

Editor:

The CoCo SIG of the Wiregrass Micro Computer Society meets twice monthly in the Fort Rucker, (Southeast) Ala. area. We represent all ages and interests. Visitors are welcome. Write: WMCS CoCo SIG, c/o Division of Computer Science, Enterprise State Junior College, P.O. Box 1300, Enterprise, Ala. 36330, (205) 393-3821.

George Huntley
Ozark, AL

A friend and I are interested in forming a CoCo Club in the Wilmington, area.

Anyone interested in joining such a gorup would be more than welcome. Call (302) 994-4171. We welcome suggestions.

Kenneth C. Pierce
Wilmington, DE

I would like to know if anyone in the Ft. Pierce/St. Lucie area would be interested in starting a Color Computer Club. If so call (305) 464-3257 or 456-8045 or write 1909 Royal Palm Dr., 33450.

David Allan
Ft. Pierce, FL

I am interested in forming a CoCo club for the Central Florida area.

If anyone is interested, please contact (305) 846-1828 or write 1326 Lester Dr., 32741.

James W. Andrews
Kissimmee, FL

The Toccoa Micro-Computer Society meets the first and third Tuesdays at Toccoa Stephens County Library. If you have any questions or would like to join, call Terry at (404) 779-3472 or Steve at (404) 886-9718.

Terry Fleming
Eastanollee, GA

The Atlanta Area Color Users Group has been in existence for three years and meets 10 months a year at the Nach Middle School in Smyrna, Ga. Meetings begin at 7 p.m. and there are no dues at present. For more information call Gary at 949-0369, Lee at 373-3216 or CBBS 378-4410.

Gary McConville
Douglasville, GA

I'd like to start a Pen-Pal Club for those of us who don't have a CoCo Club in our community. The club will have it's own BBS for those of us with modems, and will run on a CoCo with two drives, a micro-connection modem, and a LPVII. The club will also have a large selection software library for members only.

For more information please write to me at 20 Highland Dr., 03458. Enclose a small donation to cover the postage fees (any amount you see fit), and also list what your CoCo consists of (like the peripherals you own) and the things you like doing with your CoCo.

Eric Wilson
Peterborough, NH

If there are any CoCo owners in the Treasure Valley area, contact me at 920 9th Ave. South 83651.

Darly Judd
Nampa, ID

A CoCo Club is now being formed in the Sterling/Rock Falls area of N.W. Illinois. Write: CoCo, P.O. Box 187, 61071.

Rod Brown
Rock Falls, IL

We are happy to announce the formation of the Las Vegas Color Computer Users Group. Meetings are held on the first Saturday and third Sunday of the month at 4 p.m. We are interested in helping beginners as well as advanced users. For more information call 451-0991 or write 4775 S. Topaz #69, 89121

Robert Petersen
Las Vegas, NV

HUG-A-COCO meets every second Wednesday in the Motorola Office Building, 3540 N. Progress Ave., at 7 p.m. (for approximately two hours). There are no dues at this time. All visitors are welcome. For more information call 657-2789.

George Lurie
Harrisburg, PA

We are forming a TRS-80 Color Computer Users Group in the Westerly, R.I. area. At present we are meeting at the YMCA every other Tuesday from 7 to 9:30 p.m. For further information call 596-0957 or 596-1485.

Donald L. Campbell
Westerly, RI

I am trying to form a CoCo users club in the Fredericksburg area. Anyone interested call (703) 373-3242 or 373-8026. Any age welcome.

Stuart Brooks
Falmouth, VA

I am starting a CoCo Users Group in the Beckley area. Anyone interested in joining can call (304) 252-5021 or write Rt. 2 Box 76-C, 25801.

Greg Reed
Beckley, WV

We have just formed the *Pro-Color-File* National Users' Group. The purpose of our group is to exchange information related to *Pro-Color-File* and its many varied uses, hints and tips on how to use the system efficiently and details as to any user developed enhancements.

We currently have in our library a complete database of all aritcles containing program listings which have been published in computer magazines such as THE RAINBOW, and many of the programs included in the CompuServe Color SIG. We communicate among members either directly (regular or E-mail) or through our quarterly newsletter. Dues are $10 per year which includes all benefits.

Interested individuals should forward a S.A.S.E. to *Pro-Color-File* National Users Group, 12851 W. Balboa Dr., 53151.

Jorge Mir
New Berlin, WI

I'd like to start a Kids' Club in Hales Corners, Wis. area for CoCo users. Please call me at (414) 425-2824 or write 10163 W. Forest Home #205, 53130.

Garrett Rud
Hales Corners, WI

I enjoy my 16K CoCo, but I can't find anyone in the Kingston Area to trade ideas with. Anyone interested please call me at 389-0467. I really enjoy this magazine and especially liked your *Rockfest* program. Keep up the good work!

Kanti Dinda
Kingston, Ontario

We would like to annonce the name change of the Los Angeles Color Computer Users Group to Color America Users Group. We are a non-profit organization dedicated to helping Color Computerists learn more about their computers.

We currently have over 300 members. Our meetings feature guest speakers, Q & A sessions, special interest groups and software vendors.

Color America has a BBS for modem users with dozens of CoCo programs for download and a unique online interactive story.

The BBS may be reached at (818) 334-2864. Also available is a lending library of hardware, software and books.

Color Computer owners residing in Los Angeles or Orange counties can call (818) 331-7903 to receive a free newsletter. Color America would also like to exchange newsletters and public domain software with other users groups.

Mark Randall
Arcadia, CA

We would like to announce a color computer club in Southern Ill. The CoCo CUPS meet every other Thursday at 7 p.m. at the Erma Hays Center in Carbondale, Ill. Anyone interested should contact Mark Beal (618)867-2771 or Charles Thome (618) 996-22697.

Charles Thome
Creal Springs, IL

Please list the existence of a CoCo users group in New Hampshire. The Club is another pen-pal service for those who do not have a club in their community. Those who are interested can write to me for more information. The club will feature its own BBS and much more. Also include your name, address and 25 cents for postage fee. Write to: 20 Highland Dr., 03458/

Eric Wilson
Peterborough, NH

The Lockport Color Computer Club meets the third Thursday of every month. We encourage anyone interested to write to: LCCC, 6721 E. High St., 14094 or call (716) 434-3726.

Mike Salisbury
Lockport, NY

The Garden State Color Computer Users Group meets the fourth Friday of every month from 8 to 10 p.m. on the first floor of the Hill Center Building, Busch campus, Rutgers University. For more information and to verify meeting times and location, write to me at the following address: 5 North 20th Ave., 08835.

The Stargate One CoCo BBS is on-line 24 hours a day, seven days a week at 300/1200 Baud. The BBS is run on a 64K TRS-80 and the software being used is a modified Colorama BBS. Information on the Garden State CoCo Users Group, public domain programs, and other downloads is available to users. Access it by calling (201) 725-5028.

Darren Nye
Manville, NJ

We have recently organized a Color Computer club/users group. Piedmont Area Color Computer Club meets on the second and fourth Wednesdays of each month. Anyone wanting information on joining us, please write: P.O. Box 340, 27201, or call (919) 227-9669.

Buster Frafford
Alamance, NC

We would like to announce the formation of the Westmoreland Area Color Computer Operators Club (WACCO), serving Westmoreland County. The club meets to exchange information, learn graphics, and demonstrate how to take full advantage of the CoCo. We welcome all fellow WACCO's to join this non-dues club. If interested, please write to: Rd. 1, Box 240aa, 15672 or call (412) 925-1914.

David Chess
New Stanton, PA

I would like to announce the formation of the Green Bay Color Computer Club. We are in the organizational phase of development. Anyone interested should contact me at 825 William Charles Court, Apt. 3, 54304.

Terry J. Collebrusco
Green Bay, WI

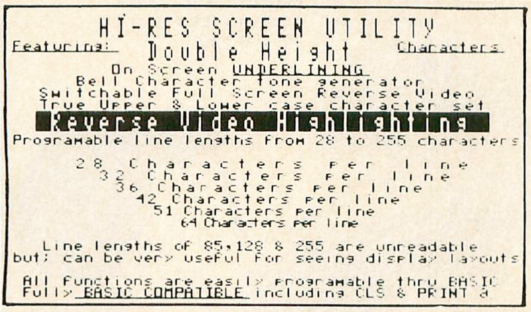
I am now stationed in Ansbach, West Germany and would like to get in touch with other CoCo users in Germany. Other users groups can contact me by phone — West Germany — 09803-847 or write me at: E Co., 501 Avn. Bn., Box 1563.

CW3 Robert Klase
APO N.Y. 09326

I am interested in finding people in Canada (particularly around Winsor and Chatem) to share ideas with. I really enjoyed the November 1983 issue about data communications but it is a little expensive to phone over to the states all the time. I can be reached at 682-0391 or write: 15 Mable St., NOP 2L0.

Chuck Mizzi
Tilbury, Ontario

HI — RESOLUTION SCREEN UTILITY



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32 Characters per line
36 Characters per line
42 Characters per line
51 Characters per line
64 Characters per line

Line lengths of 85,128 & 255 are unreadable
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Fully BASIC COMPATIBLE including CLS & PRINT @
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INTRODUCING

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Screen Formatting

Textpro III has 9 Hi-Resolution Upper/Lower case display formats available, from 28 to 255 characters per line by 24 lines. You also have advanced screen commands such as double size characters and on screen underlining. You can also use the standard 32 by 16 display for systems having lower case hardware kits installed. The display defaults to a 51 by 24 format that is easily switched to any other format available. Along with the Hi-Resolution screen we added automatic repeating keys "Typomatic." The rate is fully adjustable from ultra fast to super slow or can be turned off entirely for your convenience.

64K Support

Textpro III fully supports the use of 64K on the Color Computer. It has fast automatic memory sensing and configures itself accordingly. Textpro III does not require Extended Basic or Flex to take full advantage of a 64K RAM system. On a 64K Disk System there is over 64K of workspace available and files larger than memory are fully supported. Tape based systems have up to 48K available for workspace.

Text Editor

Textpro III has a full featured, line oriented screen editor. It supports single or multiple line copy and move, global or local search and replace of any character string, character insert and delete, block delete, adjustable speed automatic key repeat, single and automatic line edit, programmable underline and double width control coded, change screen background color and line lengths, automatic line numbering, line resequencer, and insert and delete line numbers.

Disk & Tape I/O

Textpro III uses fully compatible ASCII formatted files that do not have to be converted like some of the other Word Processing Systems. It will load, save and verify basic ASCII formatted tape files. The disk version supports Load, Save, Directory, Kill, Append, Text Process file from Disk, Roll part of file to disk and get next portion of file from disk.

DISK $59.95 **TAPE $49.95**

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Standard Commands

Textpro III features a whole host of Document Formatting commands. The setup command section includes: Line Length, Top, Left, and Bottom Margins, Page Length, Page Numbering on/off and Automatic Word Fill and Justification on/off.

Some of the vertical control features include: test for number of lines left on the page, skip to next page, set page number, wait at top of page, single and multi line spacing, and skip blank lines.

Textpro III features 3 programmable header lines that can be centered, left or right justified. It also has one programmable footer line. 3 commands for continues, single and paragraph indenting, center text, underline and double width print commands.

Footnotes and Special Commands

Some of the special features allow imbedded control codes to access intelligent printer features like; superscript, subscript, change type font and even graphics. You can even imbed control codes within justified text. There is a command that automatically places footnotes at the bottom of the page, which can be very handy for term papers, etc. Another command allows you to display a message on the screen and input text from the keyboard. This text is then printed as if it has been part of the original text, thus you can produce things like a personalized form letter. There is also a repeat command that allows you to repeat an entire document or a part of one as many times as needed up to 255 times. This can be used to produce mailing labels or combined with the previous command to produce a selected number of personalized form letters.

Tab Functions

Textpro III features an elaborate system of tab commands for complete control over column formatting. There are 10 programmable tab stops that can be defined or re-defined at any time in the text file. They can be used with the following tab commands; Center Over Tab Column, Right Justify to Tab Column, Decimal Align Over Tab Column, Left Justify to Tab Column (Normal Tab) and Horizontal Tab. Tab functions may also be used with a numeric tab column position for maximum flexibility. You can also define the Tab Fill Character to any printable character to fill in the blanks with dots, dashes, etc.

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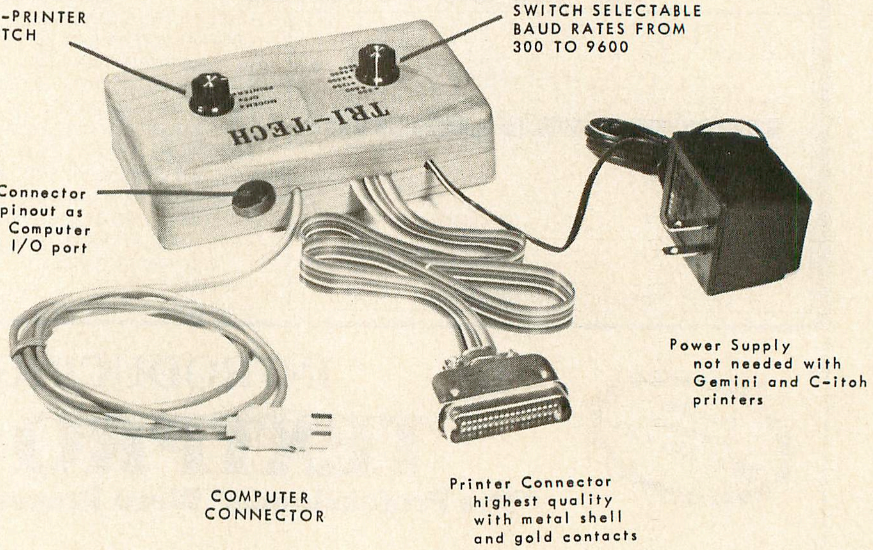
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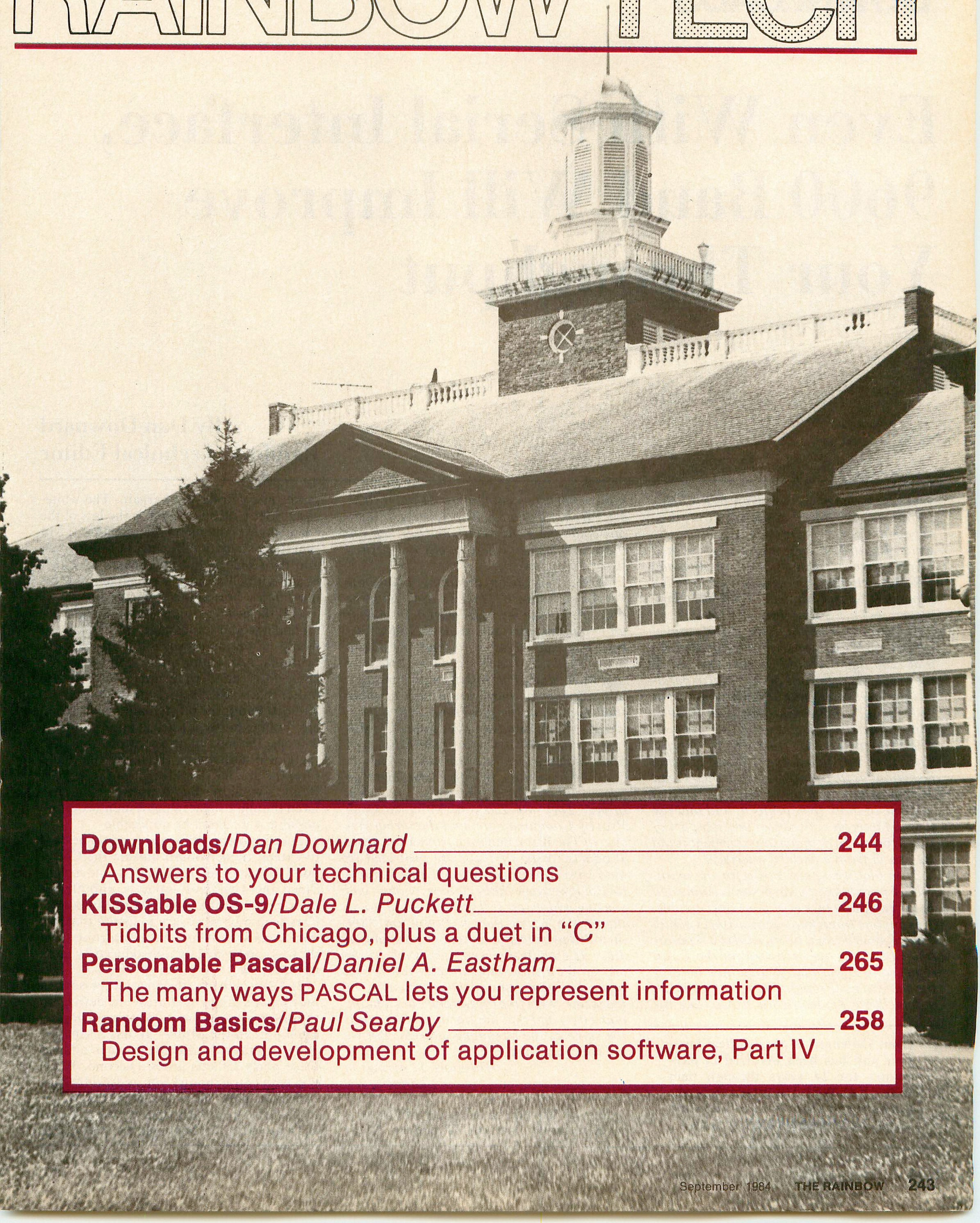

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RAINBOWTECH
DOWNLOADS

Even With Serial Interface, 9600 Baud Will Improve Your Throughput

By Dan Downard
Rainbow Technical Editor

• *We have one of the last white 64K CoCos produced by Radio Shack before they dropped them for the CoCo 2; two new white RS disk drives; Video Plus with a Gorilla green screen monitor; homemade RS-232 switcher; homemade speaker; RS acoustic connect modem; CTR-80A tape player; and a RS Line Printer VIII.*

1) Our printer has both serial and parallel capability. We use the serial hookup and run it at 1200 Baud. Would we get more out of the printer by using one of the serial to parallel interfaces on the market and running it at 9600 Baud? I have read that 1200 Baud is approximately 120 characters per second. The Printer VIII only runs at 80 to 100 cps. Therefore, I assumed that we were printing just about as fast as possible. But then I read in your column that the printer first receives one line of data, then prints it; and that the parallel interface speeds up the first part of that process. How much improvement could we expect from a parallel interface?

2) In modifying our CoCo for the monitor, we noted that the keyboard is connected to the computer by a very short ribbon cable. Has anyone thought of using a longer cable? The keyboard could be encased in a separate small box and the keyboard on the CoCo replaced by a flat plate with a hole in it for the cable to go through. The result would be a detachable keyboard for CoCo, like the more expensive computers (Tandy 2000, etc.). If the flat plate had hooks or rests on it, one could place the detachable keyboard in the usual place, or wherever else one desired (in one's lap, etc.).

(Dan Downard is an electrical engineer and has been involved in electronics for 24 years through ham radio [K4KWT]. His interest in computers began about five years ago and he has built several 68XX systems.)

3) We have been dreaming about the WorkPak *from PBJ, Inc. To use it with the disk drives, one seems to need a Y-cable or an expander interface, such as PJB's* CC-Bus, *that can access more than one pak at once. My local Tandy store people tell me that their Multi-Pak Interface does not permit software or hardware access to more than one pak at the same time. Is that true? Are there any disadvantages to the* CC-Bus *type of multi-pak device over the Tandy type other than the lack of a manual switch?*

4) We have three machine language type games we bought before we got our disk drives. They are Zaxxon, Morroco Gran Prix *by Computerware, and the verbal version of* The Black Sanctum *from Mark Data Products. None of them are protected or auto-start. Therefore, we could transfer them to disk if we knew the beginning, ending, and starting addresses. Is there a trick to finding these? We noted that* RAINBOW ON TAPE *included two machine language programs in July. The addresses were not listed in the article. We assumed that the addresses given in the documentation of the programs in the magazine were the beginning and ending addresses, and that the starting address was the same as the beginning address. But we are really not sure.*

Theodore S. Arrington
Charlotte, NC

Sounds like you have a pretty substantial investment in your CoCo, Theodore. At the same time you have a bargain. The white-cased 64K CoCo you have is the last of the "285" board computers manufactured. Not that there's a lot of difference between yours and the CoCo 2, but you have a new keyboard with old insides. Enough of my sentimentalities, how about your questions?

1) If the printer runs at 100 characters per second it would seem logical that 1200 Baud would be optimum, since the printer can't print that fast. Unfortunately, that's not the case. Most modern printers have a line buffer that is filled before the line is printed. At 9600 Baud, the printer still prints at 100 cps, but the buffer is filled at approximately 960 cps, the maximum speed possible with the CoCo. Otherwise, the higher the Baud rate, the greater the through-put. Use 9600 Baud. I wouldn't buy a parallel interface. Even though a slight improvement would be possible it wouldn't be noticeable.

2) I suppose a ribbon cable could be used to extend the keyboard outside the CoCo, but I think other problems would result. Since the keyboard input is unbuffered, interference problems would be noticeable. Care would be necessary to insure that low level signals would not have distortion from the loss and capacitance introduced by small ribbon cable.

3) At any one time the microprocessor can only do one thing, or address one device. So the salesman was correct to a certain degree. Each port in the Multi-Pak has a separate address, but with software you can address these ports 250,000 times a second. When you wish to use the disk you address the disk controller port, when accessing the Word-Pak you address the proper port, etc. As far as I know all of the bus extenders I have seen

use a similar scheme of addressing.

4) After loading a machine language program the start, end and execution addresses are in the following addresses in RAM:

```
START ADDRESS
?PEEK(487)*256+PEEK(488)
END ADDRESS
?PEEK(126)*256+PEEK(127)-1
EXEC ADDRESS
?PEEK(157)*256+PEEK(158)
```

Assuming the starting address is greater than 3584 you can use these addresses to store the programs to disk. A conflict with the disk buffer will exist if the program is below 3584. Different RAM locations are used to store these addresses when you load a program from disk, so don't try using this method for disk.

A STICKY SITUATION

• *I have a problem with my cassette system. Sometimes it will turn itself off after loading a program with the command* MOTOROFF, *but most of the time it won't. I would like to know if you know of anyone who has had this problem and how to correct it. The commands* AUDIOON *and* AUDIOOFF *work fine.*

Curtis Frazier, Jr.
Enterprise, AL

The problem you are having is common, Curtis. It is caused by a sticky cassette motor relay contact inside your CoCo. I had this problem a lot when I wasn't using a Radio Shack tape recorder. Some tape recorders switch line voltages with the motor control contacts. The relay in your CoCo is not designed to withstand these voltages. If you are using a Radio Shack recorder, have your local Service Center replace the relay. If you are using a different recorder, you may have to resort to a switching transistor between the relay and your recorder.

DOUBLE DENSITY DISKETTES

• *After I read in several places the definition of single and double density diskettes, I had assumed that you couldn't run a single density diskette in a double density drive. Recently our users group sold a disk with a lot of public domain software on it as a way of supplementing the club treasury. When I objected that the disk was a single density disk, I was told that it would run okay (and it does), and the only difference between the two was the thickness and quality of the magnetic coating on the disk. That doesn't tie in with what I have previously read, yet the disk does work fine in my RS drives. What is the real explanation?*

S.E. Clarke
Calabasas, CA

The only difference between single density and double density diskettes is the quality control procedure used to manufacture and certify the diskettes. Normally single density diskettes will work fine, but they are not guaranteed to work by the manufacturer. The recording density on double density diskettes is greater and, therefore, requires tighter QC standards.

If you are considering using anything other than single/double sided, double density make sure they are soft-sectored diskettes. Hard-sectored diskettes have more than one timing hole and will not work properly.

A BETTER PICTURE

• *I have a question for the technical people out there in magazine land. Is there anyone who can give me some answers to increase the size of the little picture that Tandy feels our CoCo should produce?*

I have the technical manual for the CoCo and it says that the VDG chip is hardwired to produce this picture in the middle of the screen.

Hard wiring means that the VDG chip is set with external components such as resistors, etc., and should be able to be changed to increase the size of the display area.

Not being able to understand the layout of the VDG chip from the manual, I cannot figure out which resistors would have to be changed or what their values would be. I hope you can tell me if this can be done, what parts would have to be changed and what the values would be.

I understand why Tandy sets the display area so small. They do it because of the way the picture tube bends at the top and the bottom. It would make the text letters look funny, but if the picture was brought out to within a quarter of an inch or so, I don't think this would bother anyone too much.

Anything would be better than what I have at this time. If I am using a 12-inch set, I end up with a 9-inch picture which is hard on my eyes.

Bob Chase
Concord, NH

Bob, one of the marketing philosophies Radio Shack followed when introducing the CoCo was the use of a standard color television as the display device. For this reason (economics), the Motorola 6847 was chosen as the LSI chip to meet the task. As you are aware, the 6847 is capable of several modes of graphic resolution, the most dense being 256 x 192 pixels. This means that character sets with much greater density are possible.

The reason they are not used is twofold. First, additional memory would have to be used (the 32 x 16 generator is built into the chip). Second, Tandy did not feel that any higher character resolution would be readable on a normal R.F. modulated TV signal.

Even though the above does not directly answer your question, Bob, the reason for the square in the middle of your TV screen follows the same line of thought. This is a hardwired feature of the 6847 VDG chip. It cannot be changed.

Personally, I'm using a monitor with a video driver board. By using the adjustments in the monitor, such as width and height, I can make the CoCo output take up as much of the screen as I wish. You can do the same thing to your TV set if you want, but you will lose picture resolution and symmetry.

As far as we know, without changing the VDG (6847), or buying a high resolution output board, such as the one manufactured by PBJ, there is no immediate solution to your problem.

A FITTING SCREEN DUMP

• *In September 1983 I purchased a Gemini 10X printer with the factory serial interface from a computer store in South Carolina. I am very happy with the printing quality and am able to access all the different fonts and styles. The problem I am having is using the dot-addressable graphics. I have tried adapting numerous screen dump programs but none seems to work. I received no documentation with the interface, and have no idea if any of the DIP switches are in the wrong position.*

Charles Nix
Albertville, AL

Custom Software Engineering of Cocoa Beach, Fla. has become a key screen dump software source for the CoCo. Look for their ad in this month's RAINBOW. I think you will find a screen dump program for a Gemini 10X along with programs for just about any other popular printer available.

DISK IS A NECESSITY

• *I desperately need an accounts receivable program on tape for my Color Computer.*

If any of your readers should have a program of this type already on tape please let me know.

Linda Grant
Anderson, SC

Linda, I think it is impractical to think of operating an accounts receivable from tape on any computer. Due to the nature of having to constantly update your database, disk operation is a necessity. There are several excellent receivables programs available for a disk-based CoCo. I personally think the CoCo is underestimated as a business computer. The business software I have seen is not as sophisticated as it could be, but it is very reasonably priced and suits the needs of many small businesses that are paying 10 times as much for the same programs.

Your technical questions are welcomed. Please address them to: Downloads, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We reserve the right to publish only questions of general interest and to edit for space and clarity.

KISSable OS-9

Reflections, Hopes and Five Helpful Listings

Dale Puckett
Rainbow Contributing Editor

We survived! RAINBOWfest Chicago was a tremendous success, as we presented two seminars, autographed nearly 200 books and picked up several dozen new members for the OS-9 Users Group. This month we'll reflect on some of the comments made in Chicago and our hopes for the future, discuss the need for standards and feature five listings that should help you learn.

Speaking of the Users Group, we now have a new address. To communicate with us write:

The OS-9 Users Group
P. O. Box 7586
Des Moines, IA 50322

(Dale L. Puckett is a free-lance writer and programmer who has worked with the Motorola family of microprocessors since 1976. He just completed his first book, The Official BASIC09 Tour Guide, *this summer. It has been published by Microware and was debuted at the Chicago* RAINBOWfest. *He is the author of* DynaSpell, Readtest, Esther *and* Help, *which are available from Frank Hogg Laboratories. He serves on the Info World Software Review Board and is a Chief Warrant Officer in the U.S. Coast Guard.)*

Dave Kaleita, chairman of the group's software exchange committee, has shipped the masters for disks numbers one through five to Frank Hogg at FHL. Disk 1 contains a spelling checker and dictionary look-up program, and Disk 2 holds its dictionary. Be warned, however, that this 80,000-word compressed monster needs a doubled-sided disk drive for a home. Disk 3 is made of a group of word processing utilities; Disk 4 features a good Adventure, an excellent Othello and several other good games; and, Disk 3 is full of useful system utility programs. Order your disks through the post office box above. Enclose $3 for each disk ordered or a program suitable for submission to the library.

Additional programs are already collecting in the software library but that will be a job for next year's chairman. This is one committee that is going to need to switch gears and move from a one man band to several dozen members. We've just recently solved the Standard OS-9/CoCo OS-9 communications problems so things are looking up.

OS-9 SIG Activity Increasing

One of the charges of the Users Group is to establish a method for OS-9 users to exchange information. And one of the best resources we've been able to come up with so far is the OS-9 SIG on CompuServe. William A. Van Nest — we call him Van — has been appointed to be the new SysOp and is attempting to fill the big shoes left vacant by the death of Jim Bellomo.

Van has been doing a tremendous job and I notice every week many new Color Computer OS-9 users are getting help from him and other old-timers on the SIG. Van has initiated regular impromptu conferences on the SIG where you can discuss problems and question the experts. Watch the SIG for announcements about special guest speakers for these conferences which have been held Saturday at 10 p.m., EDT. Keep up the good work Van, we all appreciate it.

The XA-4 database on the OS-9 SIG holds the complete OS-9 Users Group software library and all members have access to it so they can upload and download programs.

OS-9 Users Have Good Company

The skeptics just don't understand the power of that operating system you run on your CoCo. Midway through RAINBOWfest Chicago, I got into a long conversation with Jeanne Kaplan of Microware and Arlene Don of Gimix. I learned that you are in some pretty impressive company.

The Western Electric division of

American Telephone and Telegraph — the same AT&T that plans to make UNIX a household word — uses a Gimix system running a program written in BASIC09 and running under OS-9 in the final manufacturing stage of every telephone that leaves its factory in West Virginia. And most of the engineers that do the programming have Color Computers at home running OS-9. What a way to do your homework!

Would you believe OS-9 helps keep the space shuttle flying. That's right! NASA is using four Gimix systems running OS-9 at the Cape. One of these machines is used during pre-flight fuel tank testing before every launch.

If your feet are firmly planted on the ground, hear this. The Ford Motor Company uses microcomputers running OS-9 on their test track in Michigan. And, Eastman Kodak uses a BASIC09 program running under OS-9 during the final assembly stages of each disc camera that they make. They use another program running on OS-9 to ensure the quality of the film used with those cameras. As we said, you're in good company.

OS-9 Future Is Promising

If you're becoming proficient in OS-9 operation and programming you just may have a bright future. Besides the fact that AT&T will make UNIX the standard operating system if they have their way and the fact that learning OS-9 is a perfect way to learn UNIX, Tandy's Ed Juge said a few things at the CoCo community breakfast in Chicago indicating that Radio Shack just may have plans for our favorite operating system.

I spent the entire weekend, between books and seminars, trying to get straight answers about some of the rumors I've heard around the scuttlebutt. I couldn't get anyone to say anything for publication. Yet, I couldn't get them to deny anything either.

Ed Juge asked himself a question during his breakfast talk. There seemed to be more than one hint in the answer.

"We all know that you can only go so far with programs that push the technology in the hardware and still keep them compatible with every new version of Color BASIC that comes along. So, how can a software publisher guarantee that his/her new products will always be compatible with our (Tandy's) new machines?" he asked.

"He can write all of his programs using relocatable code," he said. We all do that already, don't we!

"Or, he can write all of his software in OS-9," Juge said. "OS-9 can go far beyond Color BASIC when it comes to compatibility. The programmer doesn't need to write around the systems software with OS-9 and BASIC09. He can use it. And by making OS-9 standard, we can build a better machine in the future that will still be able to run software that was written on an earlier machine," Juge said.

Juge told the breakfast crowd that Tandy had just completed a new licensing arrangement for OS-9 so that independent developers of applications software can produce their products on OS-9 and distribute them on an OS-9 disk. That disk can have a copy of the OS9Boot file and several utilities that the programmer needs to use with his application. The consumer will pick the application off the shelf of his local Radio Shack, put it in the disk drive and type *DOS*. A few seconds later he will be running the latest application. This new OS-9 user won't even see OS-9. It will be completely transparent to him. It makes great sense to me.

How Do We Keep The Future Promising

I left Chicago with strong convictions on several issues. If we are going to succeed and score touchdowns with the ball that Tandy has dumped in our laps with OS-9, we must get our act together.

First, we must stop fighting among ourselves. If we are going to win the war, we must stop the battles in our own camp. We should be fighting to beat IBM or Apple — well, maybe Commodore — instead of bickering among ourselves.

We have the kernel — pun intended — of a market that can prove very large if we make it happen. I saw the SS-50 bus lose out in competition with an inferior S-100 because of similar problems. Today, it's like watching a television rerun. Let's get it together gang. OS-9 is on its way to becoming a standard. Let's keep it that way!

We Must Stick With The Standards

OS-9 was written to work a certain way and it was designed to be modular. As long as this modularity is maintained, people with unique hardware needs can hang new devices on it by simply writing new device drivers and the matching device descriptors. Introducing a product on the market that does not follow the rules can prove bad in the long run.

I discuss this because of the questions

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we tried to answer in the July column about why you can't put a copy of Hi-Res from FHL's O-Pak in your OS9-Boot file. Actually, you can but that's a long story.

Rich Hogg, Frank's cousin and author of O-Pak, O-FLEX, RamDisk and what is turning into a large family of OS-9 products called to defend his position.

"You're right, we violated the rules," he said. "But it was one of those 'chicken and egg' questions. There was just no way we could get any static storage area for Hi-Res. We couldn't do a system request, there was no place to store a pointer.

"The only legal way we could have written Hi-Res was to create another driver, in addition to and independent of CCIO. This would have taken up a lot of memory and we didn't feel that was acceptable." Hogg said.

Rich was probably right in this case, there was no easy way out. And, he even passed along a pseudo-solution. I had already developed the same modus operandi here and it works fine, so we'll pass it along.

Leave the original, unmodified CCIO module in your OS9Boot file. Then, before you run Hi-Res, use *OS9GEN* to add Hi-Res and *StdCS* to a new OS9-Boot file. You can then add a line to your startup file which activates Hi-Res. For example, your new startup file might read like this:

```
setime </term
Hi-Res
dir
```

If you are developing system level software for OS-9 on the Color Computer and intend to market it widely, please try to keep it modular and use only standard, documented OS-9 calls. It's the only way we can protect our future.

I bring this issue up in this column because of a running battle that has raged between a fellow author and another hardware manufacturer in another magazine. The author was right and after much talk the manufacturer agreed to supply each of his customers with either "standard" OS-9 drivers or modified "non-standard" drivers written for the manufacturer. From now on out it will be the buyers' choice. Also, let the buyer beware.

I should also credit Dr. G.J. Lipovski of the department of electrical engineering at the University of Texas at Austin for contributing to this debate. He wrote to me early this year with a call for the enforcement of standards. I probably should have quoted him then. But, better late than never.

"We all have an interest in promoting the use of OS-9. I want to encourage the development of utilities like O-Pak to stimulate interest in OS-9. However, I believe that the inherent advantage of OS-9 is the clarity and efficiency of the code produced by Microware. That is what makes OS-9 so superior.

"We should try to encourage the development of good code for OS-9 utilities like O-Pak should be. We should discourage the development of sloppy inefficient code, or OS-9 will degrade to the level of Microsoft BASIC and similar hack code.

"As a contributing editor in RAINBOW, you have an opportunity to guide the development of OS-9 software. I urge you to evaluate the quality of the programs, and to reward the developers of good programs," Dr. Lipovski said. We're trying doctor!

Frank Hoffman at Lloyd I/O (that's the place that advertises Marshmallows for your CoCo) called one night a month or two ago to tell me about Do. I had a copy since Gimix licenses it from Hoffman and supplies it with their systems but I really didn't get too turned on. So, I issued a challenge to Frank. Send me a procedure file that does something useful and we'll see how it works.

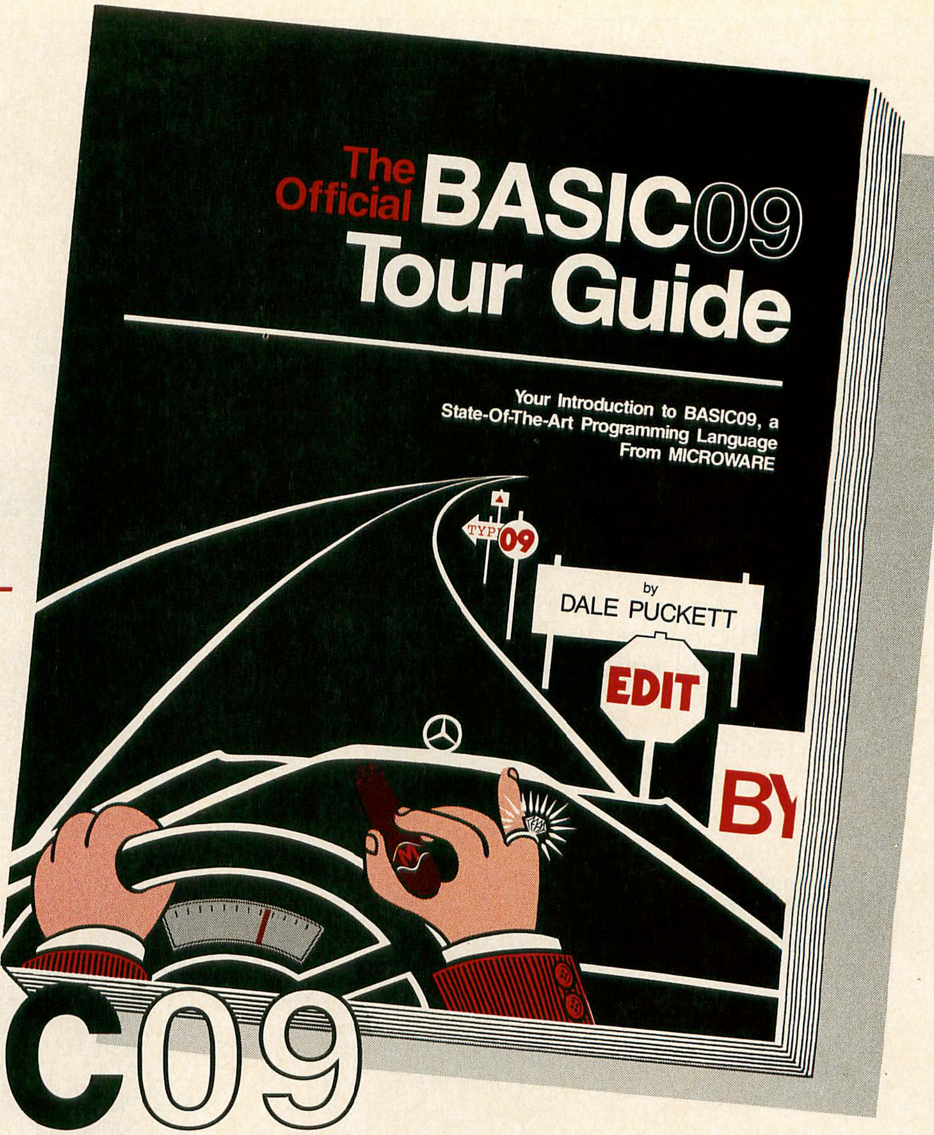
He sent the procedure "ex," and we're publishing it here. Call it with this line:

```
OS9: do #11K ex <ENTER>
```

"Ex" displays a menu for you and lets you pick one of seven OS-9 functions by typing a number. The listing reads almost like BASIC09 code so you should be able to follow it without much trouble.

One of the differences between a "Do" procedure file and the standard "Shell" procedure files you run all the time is the fact that "Do" allows you to substitute parameters. This is how the filenames are passed to OS-9's "list" and "ed" utility commands. If you own "Do" and attempt to run this procedure, make sure that the device names in your CoCo agree with the device names in the listing. Otherwise, you'll receive an error report and no action. Enjoy!

Get the most out of BASIC09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```
.ss
        tmode .1 -pause
        ON ERROR GOTO MISTAKE

MENU    REMARK - MAIN MENU DISPLAY -
        LET E=0                         ERROR =0

LOOK    PRINT .C27.C42.C48.N            HOME CURSOR AND CLEAR SCREEN
        LET &I='COCO OS9 MENU SYSTEM'   MAIN MENU MESSAGE
        PRINT .T(16-(&&I/2)).S'&I'      CENTER MAIN TITLE (80 COLUMNS)
        PRINT .N.N
        PRINT .T4.S'0...DISPLAY THIS MENU'.N
        PRINT .T4.S'1...EDIT A FILE'.N
        PRINT .T4.S'2...LIST A FILE'.N
        PRINT .T4.S'3...PRINT A FILE'.N
        PRINT .T4.S'4...DISPLAY FILE NAMES'.N
        PRINT .T4.S'5...PRINT FILE NAMES'.N
        PRINT .T4.S'6...CHANGE DIRECTORY'.N
        PRINT .T4.S'7...EXIT TO OS9'.N
        PRINT .T4.S'8...SHELL'.N

        PRINT
        IF E=1 PRINT .T4.S'COMMAND NOT FOUND'.C7        PRINT ERRORS
        IF E=2 PRINT .T4.S'FILE NAME IS IN ERROR'.C7    PRINT ERRORS
        IF E>100 REPORT E                               PRINT ERRORS

        PRINT .N.S'COMMAND:'                INPUT COMMAND
        INPUT A

        LET E=0                         RESET ERROR

        IF A=0 GOTO MENU
        IF A=1 GOTO EFILE
        IF A=2 GOTO LFILE
        IF A=3 GOTO PFILE
        IF A=4 GOTO DNAME
        IF A=5 GOTO PNAME
        IF A=6 GOTO CDIRT
        IF A=7 END
        IF A=8 GOTO SHELL

        LET E=1
        GOTO LOOK
```

```
MISTAKE RESUME LOOK

GFILE   PRINT .N.S'Path name:'          GET PATH NAME
        INPUT &F
        IFC &F,'' LET E=2               IF EMPTY STRING, ERROR 2
        RETURN

PAUSE   PRINT .N.S'HIT enter TO CONTINUE'.C7
        INPUT
        RETURN                          PAUSE

EFILE   GOSUB GFILE                     EDIT A FILE
        IF E=2 GOTO LOOK
        ED &F
        GOTO MENU

LFILE   GOSUB GFILE                     LIST A FILE
        IF E=2 GOTO LOOK
        LIST &F
        GOSUB PAUSE
        GOTO MENU

PFILE   GOSUB GFILE                     PRINT A FILE
        IF E=2 GOTO LOOK
        LIST &F >/IP1
        GOTO MENU

DNAME   DIR
        GOSUB PAUSE                     LIST DIRECTORY
        GOTO MENU

PNAME   DIR >/IP1
        GOTO MENU                       LIST DIRECTORY TO PRINTER

CDIRT   GOSUB GFILE                     CHANGE DIRECTORY
        IF E=2 GOTO LOOK
        CHD &F
        GOTO MENU

SHELL   SHELL
        GOSUB PAUSE
        GOTO MENU

.ms
```

Our next listing features a nifty filter program that takes a text file and splits it into a list of words, one per line. An obvious use would be to come up with a list of words unique to a particular document. To do this you would build a pipeline looking something like this.

OS9: splitwords <filename ! sort ! uniq <ENTER>

Uniq is a standard UNIX utility that you'll find in a package of tools authored by Brian Lantz in Pensacola. It removes duplicates from a list of sorted words. The name of Brian's package is "OS-9 Text Tools" and it is sold by Computerware.

```
.ss
PROCEDURE splitwords
 0000
 0001      DIM char:BYTE
 0008      DIM gotone:BOOLEAN
 000F      DIM inpath,outpath,errpath:INTEGER
 001E      ON ERROR GOTO 100
 0024
 0025      inpath:=0
 002C      outpath:=1
 0033      errpath:=2
 003A      gotone:=FALSE
 0040
 0041      LOOP
 0043        GET #inpath,char
 004D        IF gotone THEN
 0056          IF char=32 OR chr=9 OR chr=13 THEN
 0072            gotone:=FALSE
 0078            WRITE #outpath
 007E          ELSE
 0082            PRINT #outpath,CHR$(char);
 008E          ENDIF
 0090        ELSE
 0094          IF chr=32 OR chr=9 OR chr=13 THEN
 00B1          ELSE
 00B5            gotone:=TRUE
 00BB            PRINT #outpath,CHR$(char);
 00C7          ENDIF
```

```
00C9        ENDIF
00CB       ENDLOOP
00CF       BYE
00D1 100   (* We may have  reached the end of file *)
00FE       DIM errnum:INTEGER
0105       errnum=ERR
010B       IF errnum=211 THEN
0117         BYE
0119      ELSE
011D        ON ERROR
0120        PRINT #errpath,"Error number: "; errnum
013B        BYE
013D      ENDIF

.ms
```

Next, we have an assembly language program and two C programs written by Tim Harris at the University of Iowa in Ames. We helped Tim out with an assembly language problem in the column a few months ago. Our answers got him over the hump and rolling on OS-9 so he wanted to share some of his work with "KISSable OS-9" readers.

"Spint," stands for Search and PrINT. It is a utility which searches a file for a key string and prints all lines that contain the string. Since it is written in assembly language, it's very short and also quite fast.

"Pr," is a utility command that paginates a file listing. Optionally, it can also add line numbers for you. The line number option is very handy when listing C programs because the compiler reports the line number when it finds an error. This makes it easy to spot and correct a mistake.

"Wc," is another word count utility written in C. We included it so you could compare it to the "wc" listed last month. There's more than one way to skin a cat!

Tim has contributed these utilities to the OS-9 Users Group software exchange library so they should be available soon on the XA-4 database on the CompuServe OS-9 SIG. Eventually, they will also be assembled with other utilities on a disk available from the Users Group. Thank you, Tim.

Here are some sample calls to the utilities published this month.

```
.55
OS9: pr prog_src      \ list file named prog_src to screen
OS9: pr -n prog >/p   \ list prog to printer with line numbers
OS9: spint file word \ print each line in file that contains "word"
OS9: spint file word ! wc -l \ count number of times "word" is in file
OS9: wc -w <file      \ count number of words in file

.55
* spint
* a Search and PrINT utility for CoCo OS-9
*
*          By Tim Harris
*          651 Pammel Court
*          Ames, IA   50010
*
* Usage: spint <pathname> <search key>
*
* spint searches entire file and prints lines
* containing the search key
```

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```
*
 nam spint

* make sure you " use /d0/defs/os9defs"
 ifp1
 use /d0/defs/os9defs
 endc

 opt 1

* Data Area
bufsiz equ 255
 org 0
pathno rmb 1
match  rmb 1
keylen rmb 1
linlen rmb 2
prmptr rmb 2
key    rmb 64
buffer rmb bufsiz
       rmb 200
       rmb 200  stack
datsiz equ

* Module Macro
 mod spntend,spntnam,type,revs,spntent,datsiz
spntnam fcs /spint/
type    set prgrm+objct
revs    set reent+1

* Program Area
spntent stx prmptr  save param pointer
 lda #read.  use read access
 os9 i$open  open the input file
 bcs spnt30  branch on error
 sta pathno  save path number
 stx prmptr  save updated param ptr

* get search key
 leay key,u point y to key buffer
 clrb  keylen := 0

spnt10 lda ,x+ get a key char
 cmpa #$0D     is it a carriage return
 beq spnt15    yes, go
 cmpa #$20     no, is it a space
 beq spnt15    yes, go
 sta ,y+       else, store in buffer
 incb          keylen := keylen + 1
 bra spnt10    go for more

spnt15 stb keylen save length of key
 stx prmptr save updated param ptr
* now get a line of the file
spnt20 lda pathno get path no
 leax buffer,u point to line buffer
 ldy #bufsiz try to fill buffer
 os9 I$readln read line into buffer
 bcs spnt30 branch if error
 sty linlen else save line length
 bsr compare  compare the strings
 tst match    is key in the line?
 beq spnt20   no, go back for another line
 lda #1       yes, send line to standard output
 leay buffer,u point to line in buffer
 ldy linlen  get line length
 os9 i$writln write it out
 bcs spnt30 branch if error
 bra spnt20 else, go get more

spnt30 cmpb #e$eof is error "end of file"
 bne spnt40 no, quit
 lda pathno yes, get path number
 os9 i$close  and close the file
 bcs spnt40   exit and report error
 clrb  else clear error status
spnt40 os9 f$exit exit the program

* compare subroutine

compare clr match  match := false
 leax buffer,u  point to start
comp05 lda #$0D get an End of Line
 cmpa ,x are we there?
 beq comp30  yes, return
comp10 leay key,u point to key string
 ldb keylen  get length
 pshs x      save pointer
comp15 lda ,x+ get character from string
 cmpa ,y+ does it match key character?
 bne comp20  no, go
 decb  len := len - 1
 bne comp15 loop till end of word
 inc match  else match := true
comp20 puls x  retrieve pointer
 tst match     did we find a match
 bne comp30 yes, exit
 leax 1,x   no, bump pointer
 bra comp05  go back

comp30 rts  return
 emod       end of module
spntend equ *
 end
```

```
/* another word count utility        */
/* for the CoCo OS-9 C Compiler      */

/* (c) 1984 Tim Harris               */

/* Permission granted for Rainbow to */
/* print this listing in KISSable OS-9 */

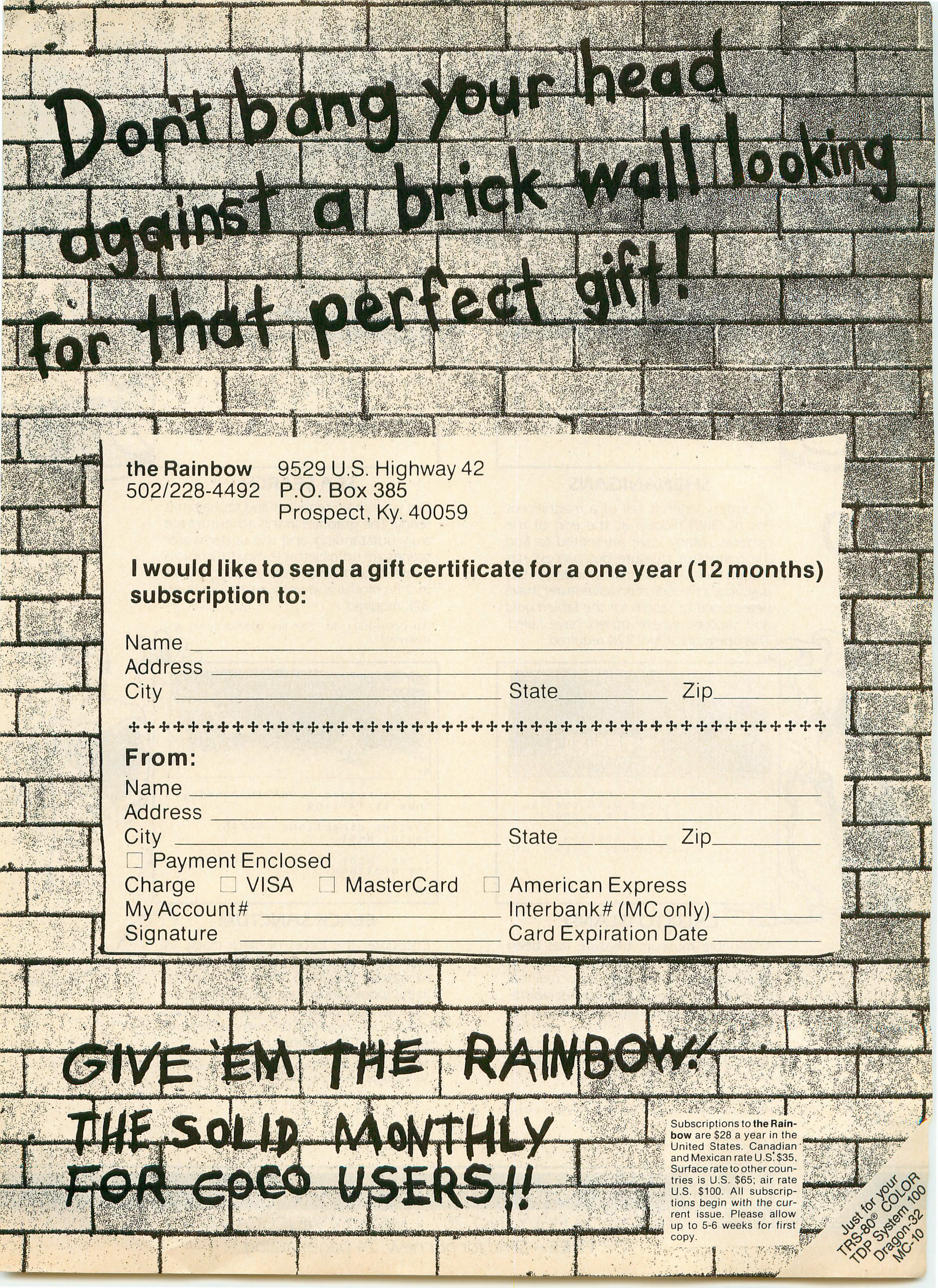
/* options:                          */
/* -l : line count only              */
/* -w : word count only              */
/* -c : character count only         */
```

```
#include <stdio.h>
#define YES 1
#define NO 0

main(argc,argv)
int argc;
char **argv;
(
    int c,nl,nw,nc,inword;
    int lon,con,won;
    char *s;
```

```
inword = NO;
nl = nc = nw = 0;
lon = won = con = YES;   /* default to all on */

while ((--argc > 0) && ((*++argv)[0] == '-'))
   for (s = argv[0]+1; *s != '\0'; s++)
      switch (*s)  (
      case 'l':
         won = con = NO;
         break;
      case 'w':
         lon = con = NO;
```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HI-RES GRAPHIC

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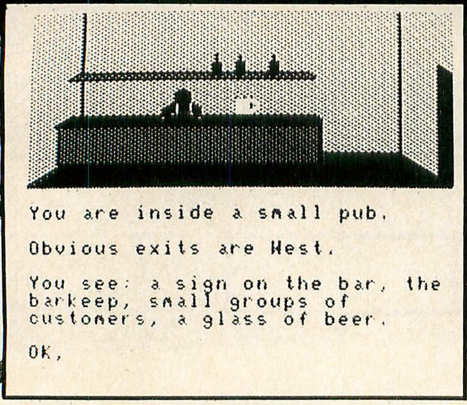


```
You are inside a small pub.

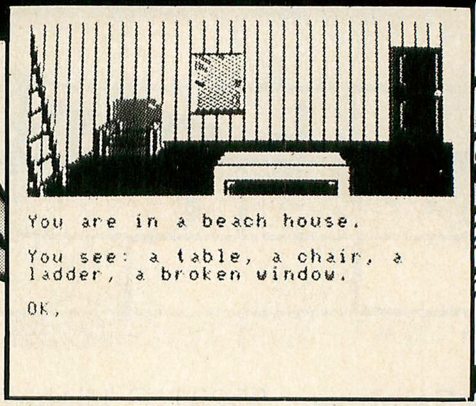
Obvious exits are West.

You see: a sign on the bar, the
barkeep, small groups of
customers, a glass of beer.

OK,
```

SHENANIGANS

Countless legends tell of a magnificent Pot of Gold hidden at the end of the rainbow. Many have attempted to find the marvelous treasure but success has eluded them and it remains hidden to this day. You, as a dedicated adventurer, have determined to search for the fabled gold and succeed where others have failed. This one is great fun! 32K required.



```
You are in a beach house.

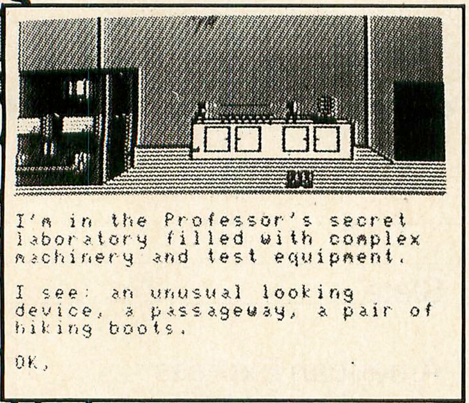
You see: a table, a chair, a
ladder, a broken window.

OK,
```

SEA SEARCH

Get your shark repellant and scuba tanks ready! The graphics in this adventure are truly outstanding and the under water scenes are unforgettable. You'll run into a pirate, a mermaid and some hungry sharks in this colorful and unique treasure hunt. 32K required.

Hot CoCo—April, '84. "The fine graphics accent your imagination. . ."



```
I'm in the Professor's secret
laboratory filled with complex
machinery and test equipment.

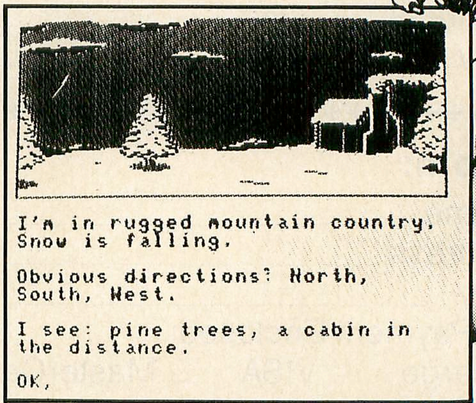
I see: an unusual looking
device, a passageway, a pair of
hiking boots.

OK,
```

CALIXTO ISLAND

A valuable museum treasure has been stolen, can you recover it??? This is a challenging puzzle with an occasional twist of humor. You'll visit a secret laboratory, a Mayan pyramid and you'll meet crazy Trader Jack—all in living color and exciting detail. You will really love this hi-res graphic version of the classic Calixto Island Adventure. 32K required.

Rainbow—April, '84. "It was enough to keep my wife and 8 year old son glued to the computer for an entire weekend and two week nights. . ."



```
I'm in rugged mountain country.
Snow is falling.

Obvious directions? North,
South, West.

I see: pine trees, a cabin in
the distance.

OK,
```

BLACK SANCTUM

Encounter the forces of black magic as you roam around an old 18th century monastery. You'll see all the evil locations in this spooky adventure, you'll love searching out and destroying the evil in this classic tale. A MUST for every adventure game fan! 32K required.

Rainbow—May, '84—"It's the graphic screens that are the shining stars. . ." "Some of the best I've seen."

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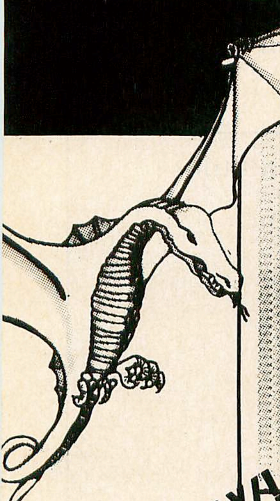
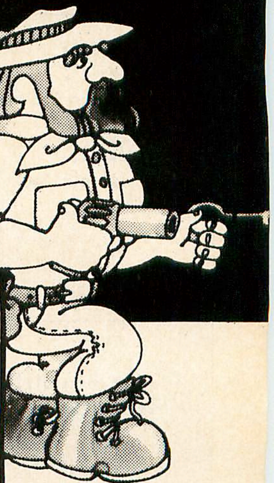
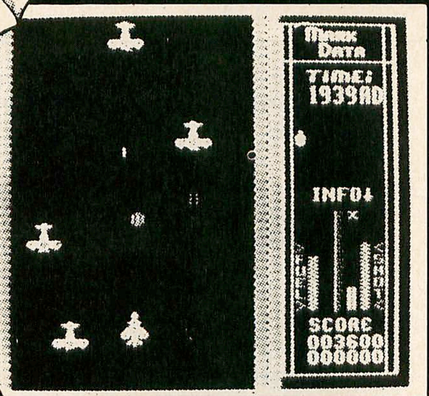




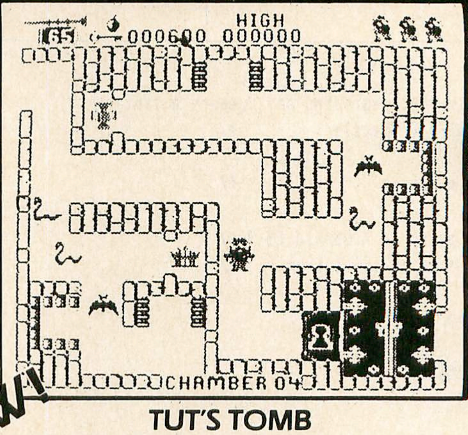


NEW!

TIME FIGHTER

Pilot your MD-64 fighter through a hazardous time tunnel. Your mission is to destroy the dreaded Time Guardian who threatens the natural order of the universe. In order to reach this menace you must fight aerial dangers from strange and different time zones. If you like fast action, this one's for you! 16K required.

Rainbow—March, '84. "One of the best in your library of computer games. . .It is a real gem."

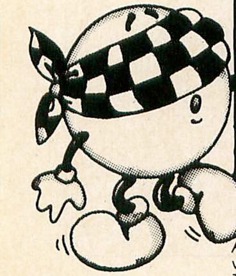


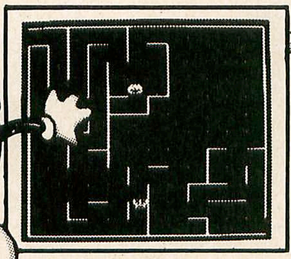
NEW!

TUT'S TOMB

Explore the ancient, mystical tomb of the great Pharoah. Find the magical keys which lead you to unbelievable treasures as you out maneuver the creatures that slither and swarm about you. Super fast arcade action—this one will knock your socks off with 16 screens of incredible color and sound. Fabulous! 32K required.

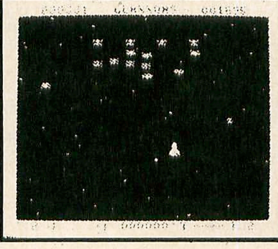
Hot CoCo—April, '84. "State-of-the-art CoCo graphics. . .A first rate game."





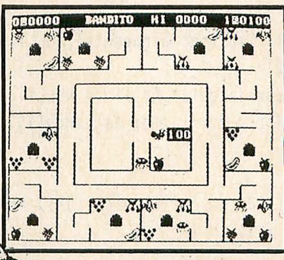
BUMPERS

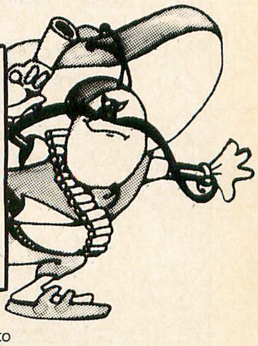
A truly great maze game. Especially exciting when two players compete simultaneously. Tension mounts as you wildly race through a hidden obstacle course. Barrier walls are invisible until you bump into them and you must proceed cautiously as each dead end has a hidden booby trap. 16K required.



GLAXXONS

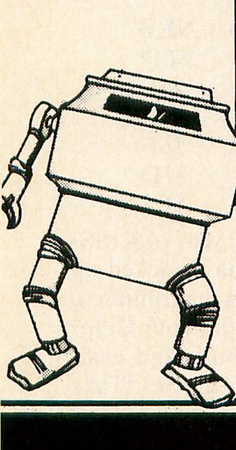
Pit your playing skill against squadrons of swooping, diving spacecraft. Fast and furious with seven selectable skill levels and automatic game acceleration. . .guaranteed to blister your joystick finger. The object of the game is to achieve the highest score by eliminating as many attacking spacecraft as possible while avoiding your own destruction. Dynamite! 16K required.

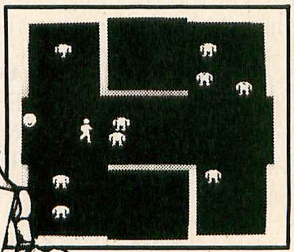




EL BANDITO

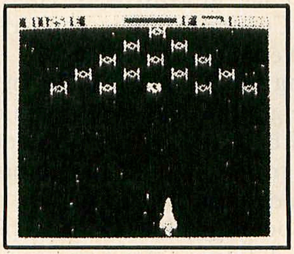
El Bandito has to be a crafty little hombre to stay alive as he loots the local countryside. Escape into a tunnel to avoid that angry spider. . .race around the corner towards your lair. Two players may compete simultaneously in this unusual game. Selectable skill levels provide a challenge for beginners as well as experts. 16K required.





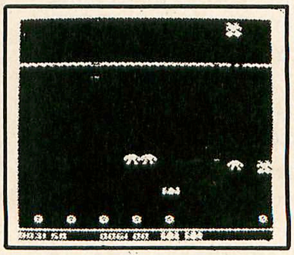
HAYWIRE

The best Color Computer version of the Berzerk arcade game you can get. . .A real hi-res classic! This challenging combination of angry robots and the evil menace will provide many hours of fun and excitement. Haywire combines joystick and fire button action and is great as a two player game. 16K required.



ASTRO BLAST

Wave after wave of alien attackers—each one different and unique. A great space "shoot-em-up" with hi-res graphics, lots of color and dramatic sound effects. Three selectable skill levels coupled with automatic game acceleration provide a challenge for novice and expert alike. One of our all time best sellers! 16K required.



COSMIC CLONES

Clonial Warriors, Super Klones, Double Bombs and "the Death Layer" relentlessly challenge the most skillful player in this unique, fast action game. Your goal is to achieve the highest score by eliminating the Clonial invasion forces thus protecting your starbase fuel cells. Fast Fun! One of our favorites. 16K required.

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```
            break;
        case 'c':
            won = lon = NO;
            break;
        default:
            printf("wc : illegal option %c\n",*s);
            break;
        }
```

```
    while ((c = getchar()) != EOF) {
        ++nc;
        if (c == '\n')
            ++nl;
        if (c == ' ' || c == '\n' || c == '\t')
            inword = NO;
        else if (inword == NO) {
            inword = YES;
            ++nw;
```

```
            }
        }
        if (lon)
            printf(" %d",nl);
        if (won)
            printf(" %d",nw);
        if (con)
            printf(" %d",nc);
        printf("\n\n");
    }
```

```
/* pr -- a utility that paginates and numbers a listing
/* for the CoCo OS-9 C Compiler          */

/* (c) 1984 By Tim Harris                */

/* Permission to print in KISSable OS-9 */
/* granted to Rainbow by the author      */

#include <stdio.h>
#define NULL 0
#define MAXLINE 256
#define PAGLEN 63

main(argc,argv)
int argc;
char *argv[];
{
    FILE *fp, *fopen();
    int linenum=1, number=0;
    char line[MAXLINE];

    if (argc > 3 || argc == 1)
       error ("pr: improper arguments",NULL);
    if (argc == 2){
       if ((fp=fopen(argv[1],"r")) == NULL)
          error ("pr: can't open %s",argv[1]);
    }
    else {
       if (argv[1][0] == '-' && argv[1][1] == 'n')
          number = 1;
       else
          error ("pr: illegal option %c",argv[1][1]);
       if ((fp=fopen(argv[2],"r")) == NULL)
          error ("pr: can't open %s",argv[2]);
    }

    while (fgets(line,MAXLINE,fp) > NULL) {
       if (number)
          printf("%05d ",linenum);
       else
          printf("      ");
       printf("%s",line);
       ++linenum;
       if (linenum > PAGLEN) {
          linenum = 1;
          printf("\n\n\n");
       }
    }
    while (linenum <= PAGLEN) {
       ++linenum;
       printf("\n");
    }
       printf("\n\n\n");
       fclose (fp);
       exit(0);
}

error (s1,s2)
char *s1, *s2;
{
    printf(s1,s2);
    printf("\n");
    exit(1);
}
```

Finally, A Review Pointer And A Few New Products

Here's a pointer — as in C — to a review of an excellent word processing package for Color Computer OS-9. Please see "What You See is What You Get" in this issue.

A short month ago there was famine in the CoCo OS-9 terminal program market. Today there is a feast. Within the last week, I have received a copy of *CMODEM* from Dr. Bud Pass at Computer Systems Consultants, Inc. in Conyers, Ga., and *The OS-9 Color Connection* from Computerware. The latter is a terminal program written by Brian Lantz.

Dr. Pass used the interrupt driven RS-232 replacement module we published here a few months ago as a "jumping off place" to solve some of the many problems that surround I/O on Tandy's silly "bit banger" RS-232 port. In the past month we have also talked to the programmers at JBM who report that their CoCo terminal program is also on the market now.

During the RAINBOWfest in Chicago we got the chance to do an interview with Ken Kaplan, president of Microware and one of the authors of OS-9 and BASIC09. He passed along some good insight into OS-9, its philosophy and future. We hope to get it transcribed and included in our birthday column.

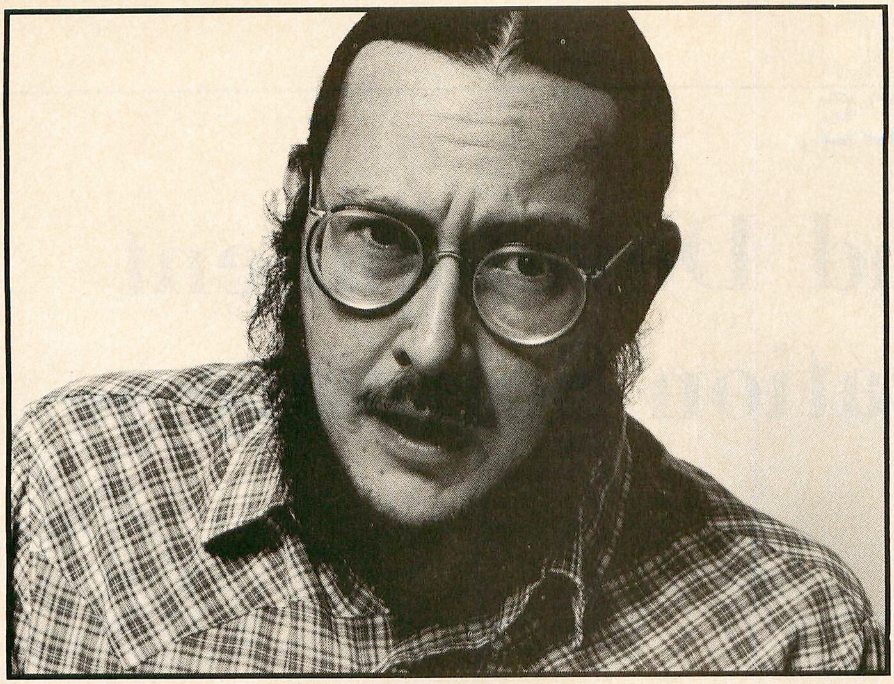
Finally, here's a bug note that Brian Lantz asked me to pass along to you. The Radio Shack OS-9 *CLOCK* module has a *big* bug in it. If you are running your CoCo continually from now on, you will discover it next leap year. The *CLOCK* module will never increase the date past Feb. 28th on a leap year. It will be 2/28 forever.

The fix is a simple six-byte patch. The last three bytes update the CRC value.

OFFSET	OLD	NEW
$57	$0E	$0D
$64	$86	$4F
$65	$01	$4C
$A8	$72	$6F
$A9	$55	$1D
$AA	$DB	$C3

That wraps up one full year of KISSable OS-9. I hope you have picked up enough information from the column to make OS-9 a useful tool on your Color Computer. It's been a busy and challenging year. Next month we "Take Two!"

See you then!



DON'T GET BURNED

THE COLOR BURNER FROM GREEN MOUNTAIN MICRO

Lately I've been hearing that you want to program erasable read-only memories (EPROMs). It seems you want to create your own program cartridges, or make changes to your Basic ROMs, or turn your CoCo into some different animal.

The problem is, most EPROM programmers cost over $100, and $100 is big dues to pay. You want to burn EPROMs, not get burned in price — or quality.

So, I've put together the Color Burner, an EPROM programmer that will burn all the "27" family — 2716, 2732, 2764, 27128. Yes, it will also burn 68764 replacements for your Basic ROMs and, no, it won't break your budget.

Although my Color Burner doesn't cost a whole lot, you won't get burned over quality. I don't cut corners in hardware. I use the best fiberglass boards, with gold edges, protective solder masking and silk-screened legends. Before I send you a Color Burner, I test it by actually programming an EPROM.

So how can it be good if it's so inexpensive? First of all, you can only get a Color Burner from Green Mountain Micro. No dealers are adding to its price. Second, it isn't fancy. No high-tech power supplies are in sight. You've got to add three homely, low-tech 9-volt batteries to get it going. Finally, it won't set new standards of complexity. It's simple, hardworking and reliable.

You can get your Color Burner complete or *a la carte*: try an assembled and tested unit, a kit, or just a bare board. Order it with or without programming software. Both kits and assembled units come with over 40 pages of documentation, complete program listings, and schematics. Nothing is hidden.

You'll burn those EPROMs, you won't get burned, and my technical support staff will keep you from getting burned up if you have a question or need help.

You Won't Get Burned with The Color Burner

- Assembled/tested with software, $69.95.
- Assembled/tested only, $64.95.
- Complete kit with software, $56.95.
- Complete kit only, $49.95.
- Board/documentation with software, $30
- Board/documentation, $23
- Bare board only, $20
- ColorPack 8/16K ROM/RAM cartridge kit, $19.95.
- 2716 and 2732 EPROMs available.

Specifications:

Programs 24/28-pin EPROMs, providing 21/25-volt programming pulses under software control. Includes unwired personality module. Requires three 9-volt batteries (not included). Tape software supports 2716 through 27128 and 68764/66 EPROM families, and requires 32/64K Extended Color Basic.

ALSO AVAILABLE FROM GREEN MOUNTAIN MICRO

Lowerkit II*, $79.95 /$49.95 kit	
64K Color memory upgrade kit, $49.95	
MC-10 added 4K upgrade kit, $19.95	
CoCoPort interface, $49.95 /$39.95 kit	
RAM/ROM pack, $29.95 /$19.95 kit	
Scroll-A-Roll software video text display, $24.95	
TV Buff II *, improved to handle virtually all monitors, $14.95	
Color Quaver, Software Music Synthesizer, $19.95	

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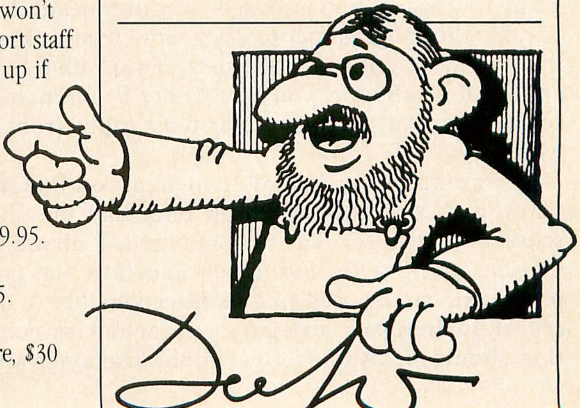

Dennis Bathory Kitsz

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RANDOM BASICS

Design And Development Of Application Software — Part IV

Paul Searby
Rainbow Contributing Editor

This article will complete the high level design of our development example, an Accounts Payable System. Last time we defined what elements we needed to store in our Master, Invoice, Activity and Keyfile records to be able to give the user comprehensive information about what is going on in his A/P system. Now we can work on the displays and reports that will present this information to the user. In actuality, consideration of the reports was taken when the records were defined. Input from someone who is going to use a system is always very important. It is all too easy for the programmer or designer to overlook something that could be critical to the user. To develop really good application software, you must either be intimately knowledgeable about the subject, or have input from someone who is.

The output is divided into two areas: on-line screen displays, and reports which show data that may have been selected, sorted, etc. The time required to obtain the information, along with how much and how the factors are presented, can be used to determine whether to display or report. In the display category, vendor and invoice information should be available by simply displaying the master records and formatting the data on the screen. This is shown in our flowchart, along with allowing changes to this information. However, when we start talking about summarizing, aging or forecasting, we now are talking about reports. This is what we will concentrate on in this article. In the discussion that follows, I have included actual sample reports from Computerware's® *Accounts Payable System.* This, by no means makes them perfect, but it does give us some good examples to examine.

(Paul Searby has been involved with computers and data processing since 1969, working primarily on larger IBM systems until 1975 when he bought, built and programmed the first "personal computer" ever made — an Altair 8800, which came in kit form with 1K of memory. In 1977 he left a position as project manager for a large corporation to devote his full efforts to his company, Computerware.)

Before going into the individual reports, let's first define just what output from an Accounts Payable System we would find helpful. Obviously we need a list of our vendors and information relevant to each. Since it might be helpful to be able to get vendor name and address labels, we should include that feature. We also need a report that shows the invoice detail information for each vendor. This report can be invaluable as a reference while talking to the vendor on the phone. Even though we don't like to discuss it, there is also a need for a past due report. And while you are on the subject of past due, a summary aged report can be quite helpful in knowing either how good you've been, or how far out of control you are! That's the neat thing about computers; they can quickly give you various ways to look at information, allowing the good manager to have greater control of the situation. Two more reports that would be quite helpful are a payment forecast report, which will help manage cash flow, and an activity report, which shows all adjustments and payments. The payments portion of this is what could be fed to another system, such as check ledger or general ledger for interactive posting.

Now that we have a fairly comprehensive list of reports, let's look at them in more detail. The vendor master report should include name and address information along with phone number and contact person. Since we also have year-to-date paid and terms period in the master record, that could be included too. We also have current invoiced, current paid and beginning balance which could also be included, along with date of last activity.

What a wish list! Before we go any further, lets talk about readability. If you can't make sense of the report, what good is it? Since most printers can now print in condensed mode, you can get 132 print columns on standard 8 ½ by 11 paper (which is what most printers use).

The following reports were designed prior to when printers with condensed print became common, so they are all designed for standard 80-column printing. There are also those who do not like condensed print reports, so if you are going to use them, it might be a good idea to also offer some reports in 80 column mode.

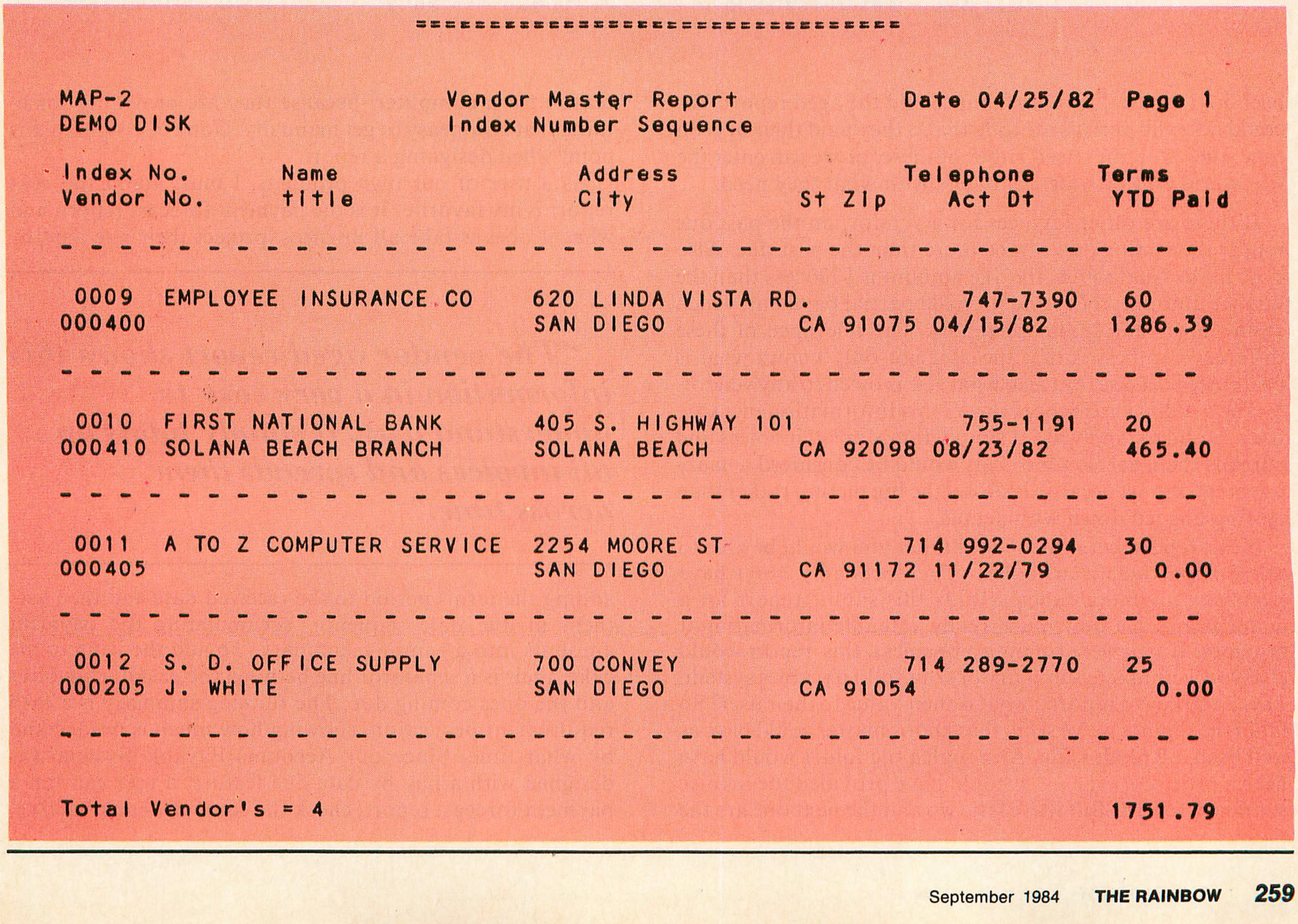
The most readable report is one that only uses one line per entry. However, this can really limit the amount of information about that entry, which can be in any given report. The solution is multiple lines per entry, but if you use this, include either spacing or separators to make the report easier to read. Below is our vendor master report in a two-line format. Even with the two lines, there was not room for all the information listed. The current accounting information was put on the invoice summary report rather than the vendor master.

Note that the heading identified the report number, the company (Demo Disk), the date, the name of the report, the sequence in which it was printed and the page number. This is what I would consider to be pretty much a standard heading. Anything less would be incomplete, and there isn't much of it left out. The labels won't be shown here, but they are the standard one-up labels which can be purchased at most Radio Shack stores or office supply stores.

The next report we listed was an invoice summary report. This actually becomes one of the more important reports in that it shows all the detail information for each vendor, along with the balances. It is a multiple-line per entry report with a header for each vendor. The first (and until paid, only) line for each invoice gives the received date and amount plus the ledger code to charge the expense to, the amount to be paid and any comments that were entered. The second line for an invoice appears when payment has been made for that invoice. Note that the report program adds a comment of either "paid in full" or "partial payment" to make it easier to scan the report.

Note that the report totaled number of vendors, number of invoices, total beginning due, total current invoices, total current payments, and new ending due total. These totals are not only quite helpful to the user, but also to the programmer in that if they don't match between reports that are using the same information, the system isn't in balance. (Since I used different extract combinations to generate these examples, the totals will not always balance.)

The next two reports are important because they help a company know, both in detail and in a temporal sense, the status of any past due invoices. This is an example of where the programmer or designer needs input from the users in that when we originally did a past due report, it was quite simple. It didn't take long before we were asked to not only



```
                  ==================================

MAP-2                        Vendor Master Report            Date 04/25/82  Page 1
DEMO DISK                    Index Number Sequence

Index No.     Name                Address                  Telephone    Terms
Vendor No.    title               City           St Zip     Act Dt       YTD Paid

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

 0009  EMPLOYEE INSURANCE CO   620 LINDA VISTA RD.               747-7390   60
000400                         SAN DIEGO         CA 91075 04/15/82       1286.39

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

 0010  FIRST NATIONAL BANK     405 S. HIGHWAY 101                755-1191   20
000410 SOLANA BEACH BRANCH     SOLANA BEACH      CA 92098 08/23/82        465.40

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

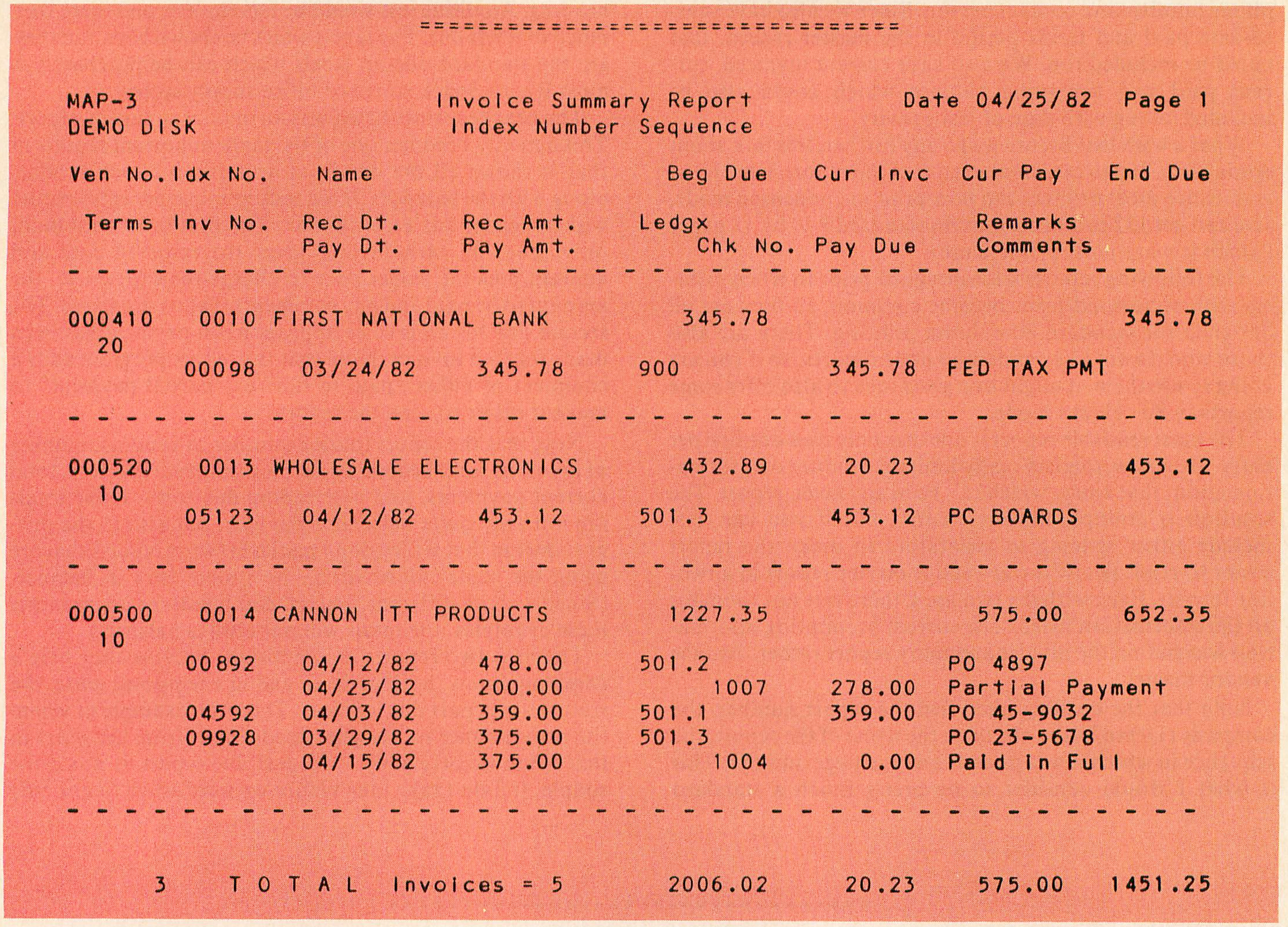
 0011  A TO Z COMPUTER SERVICE 2254 MOORE ST                 714 992-0294   30
000405                         SAN DIEGO         CA 91172 11/22/79          0.00

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

 0012  S. D. OFFICE SUPPLY     700 CONVEY                    714 289-2770   25
000205 J. WHITE                SAN DIEGO         CA 91054                   0.00

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

Total Vendor's = 4                                                       1751.79
```



```
                        =================================

MAP-3                    Invoice Summary Report          Date 04/25/82  Page 1
DEMO DISK                 Index Number Sequence

Ven No.Idx No.   Name                    Beg Due   Cur Invc  Cur Pay   End Due

 Terms Inv No.  Rec Dt.    Rec Amt.    Ledgx                  Remarks
                Pay Dt.    Pay Amt.        Chk No. Pay Due    Comments
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

000410   0010 FIRST NATIONAL BANK         345.78                        345.78
  20
        00098   03/24/82    345.78     900          345.78  FED TAX PMT

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

000520   0013 WHOLESALE ELECTRONICS       432.89     20.23              453.12
  10
        05123   04/12/82    453.12     501.3        453.12  PC BOARDS

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

000500   0014 CANNON ITT PRODUCTS        1227.35              575.00    652.35
  10
        00892   04/12/82    478.00     501.2                PO 4897
                04/25/82    200.00          1007    278.00  Partial Payment
        04592   04/03/82    359.00     501.1        359.00  PO 45-9032
        09928   03/29/82    375.00     501.3                PO 23-5678
                04/15/82    375.00          1004      0.00  Paid In Full

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -


      3    T O T A L  Invoices = 5       2006.02     20.23    575.00   1451.25
```

beef up the past due report, but to add the aged report. We could take the purist's attitude that if they paid their bills on time, they wouldn't need either of these, or we can enter the real world and provide customers with what they need.

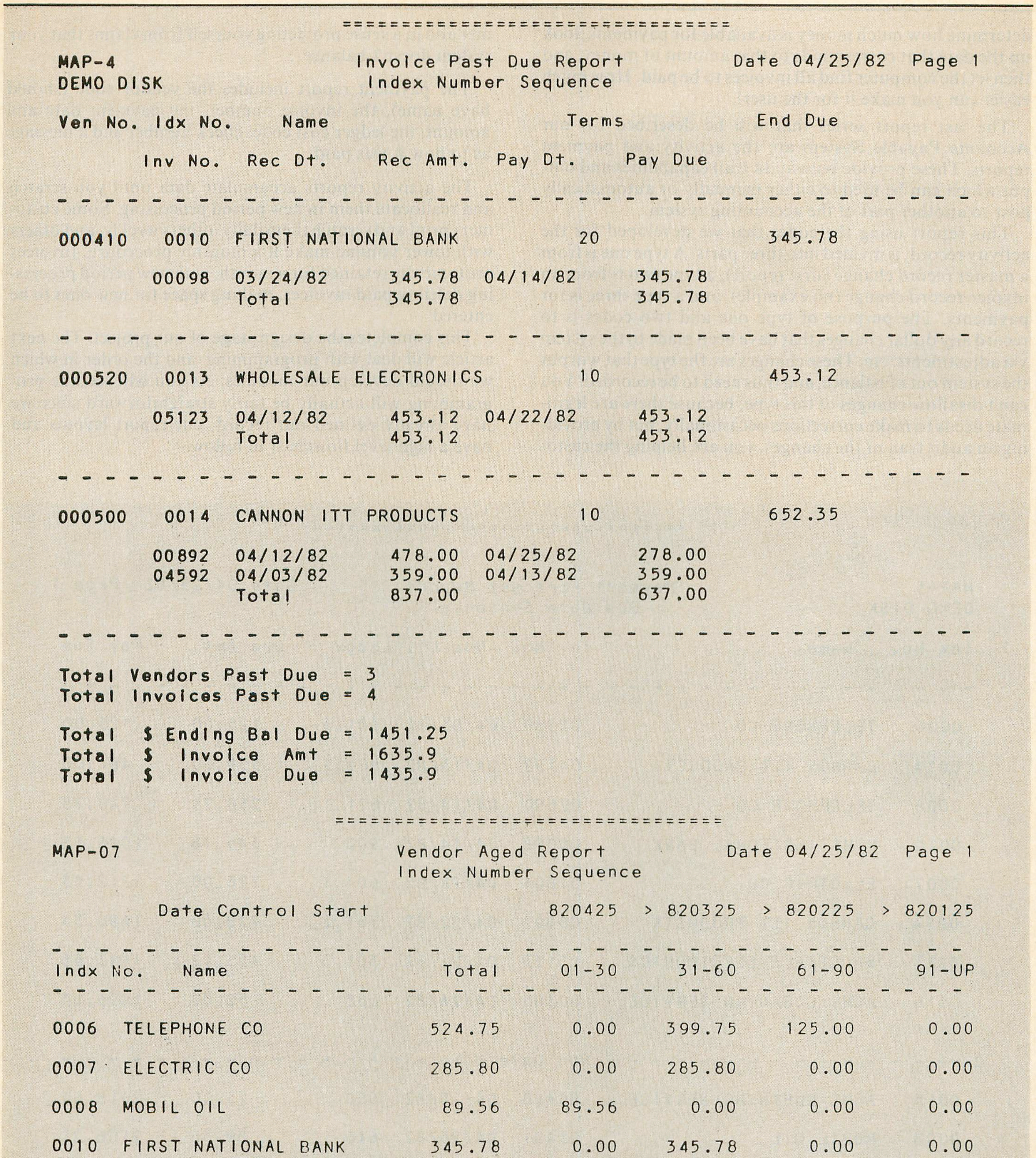
If there are other invoices for a vendor, on the past due report the ending due can be more than the past due. Also note in the final totals, the due amount is $200 less than the invoice amount, reflecting the $200 partial payment, which shows up in the summary report. The relevance of these different numbers is that the user not only knows what is currently past due, but also what else is owed to any vendor.

The vendor aged report shows this information in a very easy to understand way. It simply totals up all invoices and spreads them across time. This would be considerd a 'management' report because it shows the big picture rather than getting bogged down with details.

If this report were true, I doubt that you would be able to call this particular customer! (They probably don't have electricity anymore either!) Study this simple report for a moment and see how much really valuable information it provides. If you were running a business, this report would give you a complete summary of your total payables system. This is the key to reports: what is their value to their user? So far in the reports we've seen, the vendor master could have as well been a Rolodex file. Although a file folder would have been a little more messy, it could have provided the invoice summary report. But these last two and the next one are the reason for a computer, because they are providing something that is *not* easy to get manually. Don't lose sight of this point when designing a report.

As a user of our own products, I must admit the next report is my favorite. It is the payment forecast report, and what it does is take all invoices, project their due date by adding the terms period to the received date and then lists them in due date sequence, accumulating the payment amounts into a running summary. To add the icing to the cake, their is a separator line between the past due invoices and the ones coming due. The running summary is a cash requirement projection, showing how much is needed and by what time. Since our Accounts Payable System was designed with a pay by date due feature, a user can run a payment forecast report, check the company bank balance,

> ***"The vendor aged report shows this information in a very easy to understand way. It simply totals up all invoices and spreads them across time."***



```
                   =================================

MAP-4                      Invoice Past Due Report          Date 04/25/82   Page 1
DEMO DISK                   Index Number Sequence

Ven No. Idx No.     Name                     Terms              End Due

        Inv No.  Rec Dt.     Rec Amt.  Pay Dt.     Pay Due

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

000410   0010  FIRST NATIONAL BANK             20                345.78

        00098  03/24/82      345.78  04/14/82     345.78
               Total         345.78               345.78

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

000520   0013  WHOLESALE ELECTRONICS           10                453.12

        05123  04/12/82      453.12  04/22/82     453.12
               Total         453.12               453.12

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

000500   0014  CANNON ITT PRODUCTS             10                652.35

        00892  04/12/82      478.00  04/25/82     278.00
        04592  04/03/82      359.00  04/13/82     359.00
               Total         837.00               637.00

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

Total Vendors Past Due  = 3
Total Invoices Past Due = 4

Total  $ Ending Bal Due = 1451.25
Total  $  Invoice  Amt  = 1635.9
Total  $  Invoice  Due  = 1435.9

                  =================================

MAP-07                         Vendor Aged Report           Date 04/25/82   Page 1
                               Index Number Sequence

        Date Control Start                 820425   > 820325   > 820225   > 820125

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Indx No.   Name                   Total      01-30      31-60      61-90      91-UP
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

0006  TELEPHONE CO               524.75       0.00     399.75     125.00       0.00

0007  ELECTRIC CO                285.80       0.00     285.80       0.00       0.00

0008  MOBIL OIL                   89.56      89.56       0.00       0.00       0.00

0010  FIRST NATIONAL BANK        345.78       0.00     345.78       0.00       0.00

0013  WHOLESALE ELECTRONICS      453.12     453.12       0.00       0.00       0.00

0014  CANNON ITT PRODUCTS        637.00     637.00       0.00       0.00       0.00

0015  ACME CLEANING SERVICE      275.00     200.00      75.00       0.00       0.00

[][][][][][][][][][][][][][][][][][][][][][][][][][][][][][][][][][][][][][][]
  No.Acc                          Total      01-30      31-60      61-90      91-UP
     7   T O T A L S            2611.01    1379.68    1106.33     125.00       0.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

determine how much money is available for payments, look up the date that corresponds to that amount of money, and then let the computer find all invoices to be paid. How much easier can you make it for the user!

The last report series that will be described for our Accounts Payable System are the activity and payment reports. These provide both audit trail capabilities and output which can be used to either manually or automatically post to another part of the accounting system.

This report using the codes that we developed for the activity record, is divided into three parts. A type one is from a master record change (first report), a type two is from an invoice record change (no example), and a type three is for payments. The purpose of type one and two codes is to record any dollar changes that have been made to the system via adjustments, etc. These changes are the type that will put the system out of balance, and thus need to be recorded. You can't disallow changes of this type, because there are legitimate needs to make corrections occasionally, but by providing an audit trail of the changes, you are helping the customer and in a sense protecting yourself from claims that your system doesn't balance.

The payment report includes the vendor code (should have name), the invoice number, the payment date and amount, the ledger cost code, check number and a message as to how it was paid.

The activity reports accumulate data until you scratch and reallocate them in new period processing. Some customers print and scratch them daily, others weekly, and others with lower volume make it a monthly procedure. Invoices are typically retained for a month, with new period processing deleting paid invoices, making space for new ones to be entered.

This completes the design stage of our project. The next article will deal with programming, and the order in which we should develop our modules. As you will see, the programming will actually be fairly straightforward since we have already defined our record, our report layouts and have a high level flowchart to follow.

```
                    =================================

MAP-5                      Payment Forecast Report          Date 04/25/82   Page 1
DEMO DISK                      Due Date Sequence

Idx No.   Name                        Inv No.  Due Dt.  Ledgx     Due Amt.     Pay Sum

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

 0006    TELEPHONE CO                 02589  04/03/82  601.3       125.00      125.00

 0014    CANNON ITT PRODUCTS          04592  04/13/82  501.1       359.00      484.00

 0006    TELEPHONE CO                 02690  04/14/82  601.1       256.75      740.75

 0010    FIRST NATIONAL BANK          00098  04/14/82  900         345.78     1086.53

 0007    ELECTRIC CO                  01004  04/22/82  604.1       126.00     1212.53

 0014    CANNON ITT PRODUCTS          00892  04/22/82  501.2       278.00     1490.53

 0013    WHOLESALE ELECTRONICS        05123  04/22/82  501.3       453.12     1943.65

 0015    ACME CLEANING SERVICE        00305  04/24/82  665          50.00     1993.65

- - - - - - - - - - - - - - - - - - Run Date Line - - - - - - - - - - - - - - - - - -

 0015    ACME CLEANING SERVICE        00448  04/25/82  660          25.00     2018.65

 0008    MOBIL OIL                    03491  04/26/82  616          89.56     2108.21

 0006    TELEPHONE CO                 02785  04/27/82  601.2       143.00     2251.21

 0007    ELECTRIC CO                  03009  04/27/82  604.3       100.50     2351.71

 0015    ACME CLEANING SERVICE        07784  04/27/82  660         100.00     2451.71

 0015    ACME CLEANING SERVICE        00553  05/03/82  665         100.00     2551.71

 0007    ELECTRIC CO                  03006  05/04/82  604.2        59.30     2611.01

         T O T A L S                                                          2611.01
```

```
                    =================================

 MAP-6   ( 3 )              Activity-Payment Report             Date 04/25/82   Page 1
 DEMO DISK                          Unsorted

 Idx No.  Cd   Inv No.    Pay Dt.    Pay Amt.    Ledgx    Chk No     Message

  0006    32   02007     04/15/82      25.00     601.1   99999    Paid By Acct.
  0006    32   09006     04/15/82     -25.00     601.2   99999    Paid By Acct.
  0006    32   02007     04/15/82      95.00     601.1    1000    Paid By Acct.
  0006    32   05598     04/15/82     140.00     601.2    1000    Paid By Acct.
  0006    32   02046     04/15/82     130.00     601.3    1000    Paid By Acct.
  0006    32   09006     04/15/82    -257.00     601.2    1000    Paid By Acct.
  0006    32   02234     04/15/82     145.60     601.2    1000    Paid By Acct.

  0008    33   03401     04/15/82     135.67     616      1003    Paid By Date

  0014    33   09928     04/15/82     375.00     501.3    1004    Paid By Date

  0015    33   09005     04/17/82     -10.00     665      1005    Paid By Date
  0015    33   09003     04/17/82     -50.00     665      1005    Paid By Date
  0015    33   03304     04/17/82      75.00     665      1005    Paid By Date

  0014    31   00892     04/25/82     200.00     501.2    1007    Paid By Invoice No.


 Total Activity: 13

 Total Credits:        -342.00

 Total Invoices:       1321.27

 Net Amount Paid:       979.27
```

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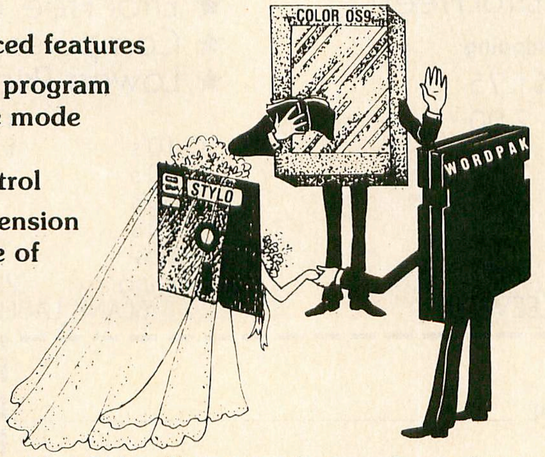

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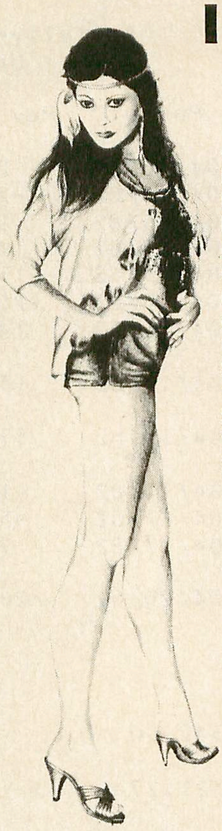

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PERSONABLE PASCAL

Examining the

PART I

By Daniel Adams Eastham
Rainbow Contributing Editor

In the last column we talked about executable statements and how they are used to direct the operation of the computer. They do this by inputting, manipulating and outputting information or *data*. This data is always kept in the form of ones and zeros, and (almost) always represents something other than ones and zeros. We usually make some combination of ones and zeros represent more familiar objects that we wish to manipulate like the letter A or the number 23.

Bytes and Bits

The ones and zeros in the computer are called bits and are arranged in groups of eight which are called bytes; 1,024 of these bytes are called a K (short for kilobyte). A 64K Color Computer has over one-half million bits of memory, which can be used to store programs and working data.

(Daniel Adams Eastham holds a B.S. degree in computer science and has 13 years experience in systems and communications programming, including work on the original Telenet packet switching network. He is the author of the DEFT PASCAL Workbench *and is currently president of DEFT Systems, Inc.)*

Most data is represented by one or more whole bytes. Since an individual byte has eight bits, each of which has two possible values (one or zero), a byte can, therefore, have any one of 256 values. One way to think of these values is that they represent eight-digit, base two numbers from 00000000 to 11111111. The equivalent range of numbers in base 10 is zero to 255.

Representing Data

While the numbers zero to 255 may sometimes be exactly what we want to manipulate, usually we wish to work with some other type of data. This may be the letters of the alphabet, the months of the year or dollars and cents. These items each represent a class or type of information which has some finite range of distinct values. There are 26 letters in the alphabet, 12 months in the year and 1,000,000 possible combinations of dollars and cents in a checking account.

We can use one, two or more bytes of memory to represent a specific type of information. We then assign a specific combination of bits within those bytes to represent a particular value of that type. For example, if we use one byte to represent a month of the year, we have 256 possible values. We assign the value zero to January, one to February, two to March and so on until 11 is assigned to December. The remaining possible values are then referred to as undefined and we won't use them.

Pre-Defined Types

In every language, there are some types that are already defined for you. In BASIC you have real numbers and strings. In PASCAL you have real numbers, integers, characters and booleans. Many PASCAL compilers also have strings as a pre-defined type. The specific number of bytes used to represent each type will vary from one compiler to another. For Deft PASCAL the following pre-defined types are explained:

* **char** — this is a one-byte type which represents the ASCII character set. For example, the values 65 to 90 represent the letters A through Z and the values 97 to 122 represent the letters a to z. Other values represent special characters such as dollar sign and control characters like carriage return.

* **boolean** — this is a one-byte type which uses only two possible combinations of bits, zero and one. Zero represents false and one represents true.

- **integer** - this is a two-byte type which represents the whole numbers from -32768 to +32767.
- **real** — this is a six-byte type that represents both the positive and negative real numbers in the range 10 to the -64 power to 10 to the +63 power. Since the number of real numbers between any two real numbers is infinite, this type cannot represent all of them. Rather, all the real numbers with the same first 10 digits are represented by a particular value.
- **string** — this is an 81-byte type that represents groups of up to 80 char types.

There is also another predefined type text which we will talk about in the next column.

The TYPE Statement

In addition to providing these predefined types, PASCAL also allows you to define your own types. This is done with a *TYPE* statement which looks like this:

TYPE <identifier> = <type definition>;

This statement defines a new type whose name is "identifier" and whose definition is "type definition." It is important to note that this statement does not define a variable which actually occupies a place in memory, but rather the way that information will be represented when a variable of this type is later defined.

One kind of type definition is merely the name of a previously defined type. For example:

TYPE Money = Real;

This defines a new type called Money which is equivalent to the pre-defined type Real.

Enumerated Types

One of the more interesting ways to use the *TYPE* statement is to define an enumerated type. The general form of an enumerated type definition is:

(<identifier>, <identifier>, ... , <identifier>)

An enumerated type identifies a direct representation of binary values to some particular set of objects. For example:

TYPE Month = (January, February, March, April, May, June, July, August, September, October, November, December);
OperateState = (Idle, Running, Waiting, Stopped);

You can see that you can define more than one type in a single *TYPE* statement. The first type is Month which represents the months of the year. The <identifiers>, January through December, are implicitly defined as constants of type Month. The order of the constants is important since the first one will be represented with the binary value zero, the second with one and so on until the last (December) is represented with an 11.

The second type, OperateState, is the operational state of a piece of machinery. The constant Idle is represented by the value zero, Running by the value one, Waiting by the value two and Stopped by the value three.

Enumerated types can be used in subrange, *ARRAY* and *SET* type definitions as well as in defining variables. Operations that you can perform with enumerated type variables are described below.

Subrange

All of the types (except Reals) that we have been discussing up to this point are called ordinal types. These types all consist of a set of discrete values. Sometimes you want to use only a subset of the values of an ordinal type. You do this in PASCAL by defining a subrange. For example:

TYPE SummerMonths = (June..August);
SmallInteger = -128..127;
CapLetters = ('A'..'Z');

In the above example, SummerMonths is a subrange of the base type Months and consists only of the values June, July and August. SmallInteger is a subrange of the base type Integer and consists of only the values from -128 up to +127. Most PASCAL compilers will use only as many bytes of memory as necessary to represent a given type so that SmallInteger will usually only take up one byte of memory. Finally, CapLetters is a subrange of type char consisting of only the capital letters.

ARRAY

One of the major uses of a subrange type is in the definition of an array type. Like BASIC, an array in PASCAL is a collection of like types which can be accessed randomly. The general definition of an array type is:

ARRAY [<ordinal type definition>] OF <type definition>

The ordinal type definition describes the number of elements in the array *and how they are accessed.* The type definition describes the type of each element in the array. For example:

TYPE MonthDays = 28..31;

```
DEFT PASCAL V3.2              (C) 1984 DEFT SYSTEMS, INC.      PAGE   1
Calendar Program



00 0000   (* This program creates a one month Gregorian    *)
00 0000   (* calendar for any month from January of year 1 *)
00 0000
00 0000   PROGRAM Calendar (Input, Output);
00 0000
00 0000   TYPE Months = (January, February, March, April, May, June, July,
00 0000                  August, September, October, November, December);
00 0000
00 0000   VAR  DaysInMonth : ARRAY [January..December] OF 28..31;
00 0000        Month, M    : Months;
00 0000        Year, FirstDay, DayOfMonth, I : Integer;
00 0000
00 0000   BEGIN
01 0007     DaysInMonth[January] := 31;
01 001A     DaysInMonth[February] := 28;
01 002E     DaysInMonth[March] := 31;
01 0042     DaysInMonth[April] := 30;
01 0056     DaysInMonth[May] := 31;
01 006A     DaysInMonth[June] := 30;
01 007E     DaysInMonth[July] := 31;
```

```
VAR MyArray : ARRAY [1..20]
  OF Real;
  DaysInMonth : ARRAY
     [Months] OF MonthDays;
```

The first variable is an array which is defined very similarly to the way that you would define one in BASIC. This one has 20 elements which are accessed by using the integers one through 20 and each element of the array is a real. You can see that subranges are frequently used when defining the range and number of elements in an array.

The second variable is an array called DaysInMonth. It has one element for each month and consists of a subrange of integers which describe the number of days in the particular month.

The way that you access elements of an array variable is by naming the variable and following it with a subscript enclosed in square brackets ([]). For example:

```
MyArray[3]
DaysInMonth[April]
```

Multi-Dimensioned Arrays

PASCAL has no inherent limit on the number of dimensions that an array can have. There are several ways that you can define additional dimensions:

```
TYPE Row = ARRAY[1..80] OF
          Char;
     Screen1 = ARRAY[1..24] OF
          Row;
     Screen2 = ARRAY[1..24] OF
          ARRAY[1..80] OF Char;
     Screen3 = ARRAY[1..24,
          1..80] OF Char;
```

All three of the above two-dimensional arrays describe 24 rows of 80 characters each. In all three instances additional dimensions can be added by using any of the three methods. An element of a multi-dimensioned array can be accessed using either of the following notations:

```
ScreenVar[3, 4]
ScreenVar[3][4]
```

Operations On Ordinal Types

Once you are able to define all of these data types, you have the problem of how to use them. As described in the last column, there is a complete expression syntax for creating integer and boolean type expressions. One of the key characteristics of PASCAL is that you are not allowed to mix different types in an expression or assign one type to another. This means that you cannot add a char to an integer or compare a

```
01 0092      DaysInMonth[August] := 31;
01 00A6      DaysInMonth[September] := 30;
01 00BA      DaysInMonth[October] := 31;
01 00CE      DaysInMonth[November] := 30;
01 00E2      DaysInMonth[December] := 31;
01 00F6
01 00F6      Page;
01 0102      WRITELN;
01 010A      WRITELN;
01 0112      REPEAT
01 0112        WRITE ('ENTER YEAR: ');
01 012F        READLN (Year);
01 0144        IF Year < 1 THEN WRITELN ('INVALID YEAR');
01 0171      UNTIL Year >= 1;
01 017E
01 017E      REPEAT
01 017E        WRITE ('ENTER MONTH: ');
01 019C        READLN (Month);
01 01B1        IF (Month < January) OR (Month > December) THEN
01 01E0          WRITELN ('INVALID MONTH');
01 01FF      UNTIL (Month >= January) AND (Month <= December);
01 022E
01 022E      Year := Year - 1;
01 0241      FirstDay := (1+Year+Year DIV 4-Year DIV 100+Year DIV 400) MOD 7;
01 029D      Year := Year + 1;
01 02AA      IF Year MOD 4 = 0 THEN DaysInMonth[February] := 29;
01 02DA      IF Month > January THEN FOR M := January TO PRED (Month) DO
01 0302        FirstDay := (FirstDay + DaysInMonth[M]) MOD 7;
01 0330
01 0330      Page;
01 033C      WRITE ('          ');
01 0357      CASE Month OF
01 035A        January   : WRITE ('JANUARY');
01 037E        February  : WRITE ('FEBRUARY');
01 03A2        March     : WRITE ('MARCH');
01 03C3        April     : WRITE ('APRIL');


DEFT PASCAL V3.2                (C) 1984 DEFT SYSTEMS, INC.     PAGE   2
Calendar Program




01 03E4         May       : WRITE ('MAY');
01 0403         June      : WRITE ('JUNE');
01 0423         July      : WRITE ('JULY');
01 0443         August    : WRITE ('AUGUST');
01 0465         September : WRITE ('SEPTEMBER');
01 048A         October   : WRITE ('OCTOBER');
01 04AD         November  : WRITE ('NOVEMBER');
01 04D1         December  : WRITE ('DECEMBER')
01 04F0       END;
01 04F2       WRITELN (Year);
01 0507       WRITELN ('   SUN MON TUE WED THU FRI SAT');
01 0537       DayOfMonth := 0;
01 053C       REPEAT
01 053C         WRITELN;
01 0544         WRITE ('  ');
```

boolean with an enumerated. However, a subrange of a type is completely compatible with its base type and other subranges of the same base type.

PASCAL does include some type transfer functions. *ORD* takes any ordinal type expression as an argument and returns the corresponding integer value. *ODD* takes an integer type expression and returns a TRUE or FALSE boolean type value depending on whether the value is odd. *CHR* takes an integer type expression and returns the corresponding char type value.

Enumerated type variables can be assigned, compared, passed to a *PROCEDURE* or *FUNCTION* as a parameter, used as the subscript for an array reference or as an index value in a *FOR* statement, used as the selector in a *CASE* statement and used with the *SUCC, PRED* and *ORD* functions.

The *SUCC* and *PRED* functions are general functions which take a value of any ordinal type and return the next higher (*SUCC*) or next lower (*PRED*) value of the same type. For integers, this is the same as adding or subtracting one. For an enumerated type, these functions return the constant in the enumerated list which is the one preceding or following the value given to the function.

```
01 0557       FOR I := 1 TO FirstDay DO WRITE ('    ');
01 058E       REPEAT
01 058E         DayOfMonth := DayOfMonth + 1;
01 059B         WRITE (DayOfMonth:4);
01 05AF         FirstDay := FirstDay + 1;
01 05BC       UNTIL (FirstDay = 7) OR (DayOfMonth = DaysInMonth[Month]);
01 05EE       WRITELN;
01 05F6       FirstDay := 0;
01 05FB     UNTIL DayOfMonth = DaysInMonth[Month];
01 0610   END.

SYMBOL      CLASS      STRUCT ALLOC      DATA TYPE      VALUE    LOW  HIGH  SIZE

APRIL       CONSTANT                     MONTHS             3      0     0     1
AUGUST      CONSTANT                     MONTHS             7      0     0     1
DAYOFMONTH  VARIABLE          AUTOMATIC  INTEGER          -24 -32768 32767     2
DAYSINMONTH VARIABLE   ARRAY  AUTOMATIC  INTEGER          -16      0    11    12
DECEMBER    CONSTANT                     MONTHS            11      0     0     1
FEBRUARY    CONSTANT                     MONTHS             1      0     0     1
FIRSTDAY    VARIABLE          AUTOMATIC  INTEGER          -22 -32768 32767     2
I           VARIABLE          AUTOMATIC  INTEGER          -26 -32768 32767     2
JANUARY     CONSTANT                     MONTHS             0      0     0     1
JULY        CONSTANT                     MONTHS             6      0     0     1
JUNE        CONSTANT                     MONTHS             5      0     0     1
M           VARIABLE          AUTOMATIC  MONTHS           -18      0    11     1
MARCH       CONSTANT                     MONTHS             2      0     0     1
MAY         CONSTANT                     MONTHS             4      0     0     1
MONTH       VARIABLE          AUTOMATIC  MONTHS           -17      0    11     1
MONTHS      TYPE                         MONTHS             0      0    11     1
```

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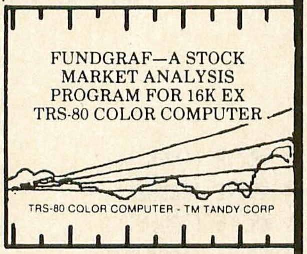
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Example Program

This program displays a one month calendar (Gregorian) for any month since 1 A.D. First it prompts you for a year and month and then it lays the corresponding calendar on the screen.

The enumerated type Months defines the months of the year and is used to define the array DaysInMonth. Each element of DaysInMonth is initialized with the number of days in the corresponding month. Two *REPEAT* loops then prompt for and validate the year and month. The *READLN* statement that reads the month requires you to enter the corresponding month number (where January is month number zero).

After reading in the year and month, the program then computes the first day of the week in the year and then in the month and saves it in FirstDay. It then uses Month in a *CASE* statement to display the name of the month. Finally, the two nested *REPEAT* statements actually display the numbers. FirstDay is used to determine how many weekdays to space over before displaying the first number; and DayOfMonth contains the actual day of the month.

In the next column we will talk about structured types and how PASCAL makes it easy to represent and use more complex types of data.

```
NOVEMBER     CONSTANT                     MONTHS       10      0      0     1
OCTOBER      CONSTANT                     MONTHS        9      0      0     1
SEPTEMBER    CONSTANT                     MONTHS        8      0      0     1
YEAR         VARIABLE       AUTOMATIC     INTEGER     -20 -32768  32767     2

STACK REQUIREMENTS:     44
CODE SIZE             1556
UNUSED STACK         32773
MAX SYMBOLS            118
TOTAL ERRORS             0
SOURCE FILE: CALENDAR:1
OBJECT FILE: CALENDAR:1
```

Contest Winner . . .

Our judges are fast! Here's the first winner in "The Great Rainbow One-Liner Contest," just announced in Jim Reed's column on Page 16 of this issue.

Look for more winners in future issues, or become one yourself by sending in your best One-Liner.

Congratulations, Tim!

SPIRALES

```
0 CLS:PRINT"ENTER # OF DEGREES B
ETWEEN ARCS,HIT ANY KEY TO GO AG
AIN.",:PRINT:PRINT"LAST="I:INPUT
I:PMODE4:PCLS:SCREEN1,1:LINE-(12
8,96),PRESET:FORR=0TO160STEPI/57
.3:LINE-(.7*R*COS(R)+128,.6*R*SI
N(R)+96),PSET:NEXT:FORZ=0TO1STEP
0:IFINKEY$=""THENNEXTELSE0
```

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	Book Market
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Schaumberg	Data Domain
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Springfield	Book Emporium
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	MicroSolutions
Irving	Software Access
Orange	Northway Books & News
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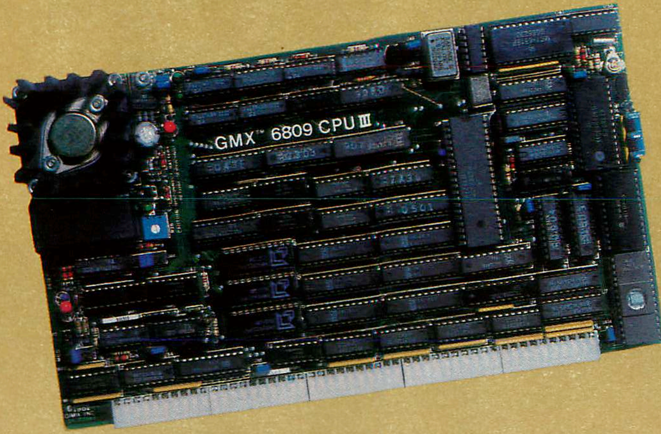

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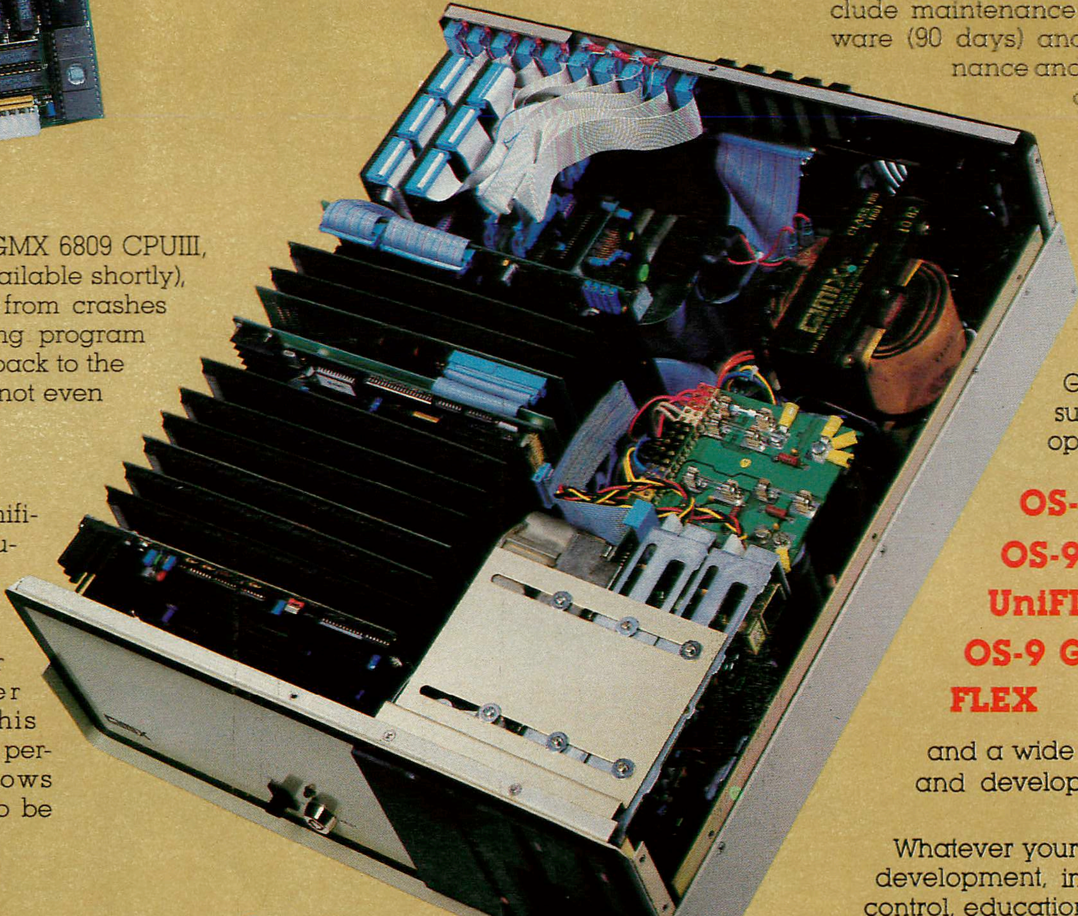

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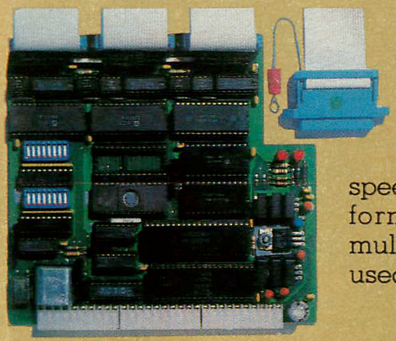

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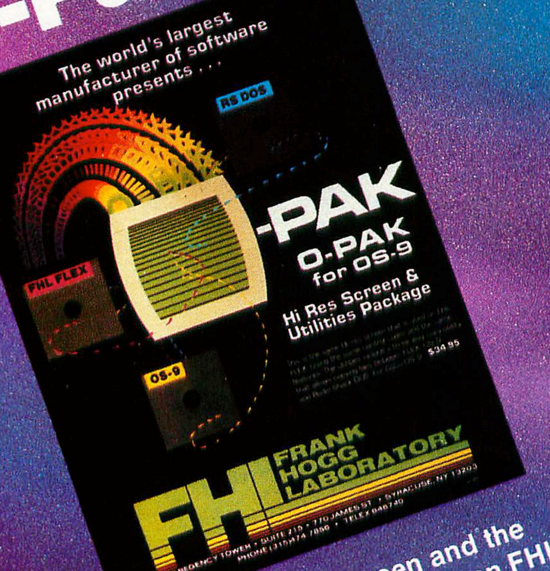

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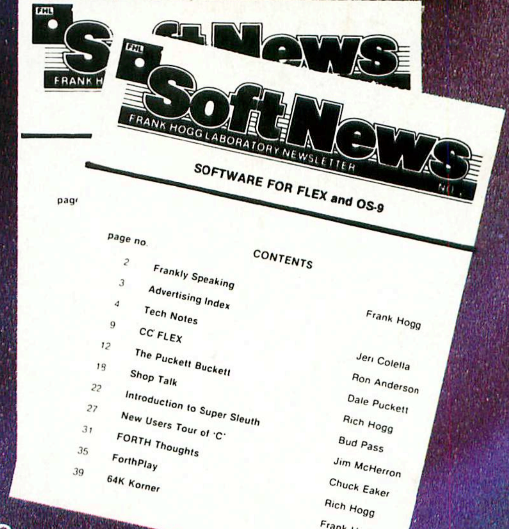

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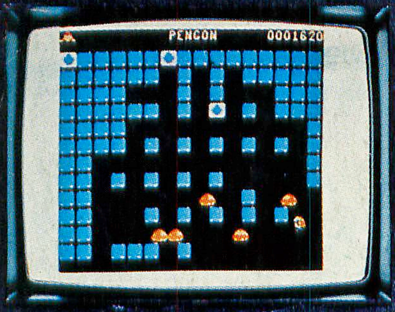

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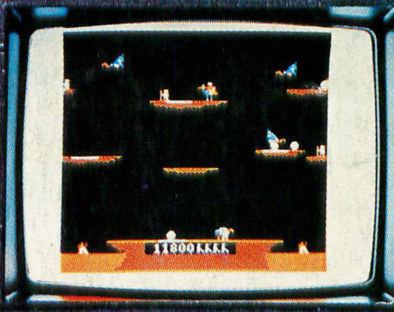

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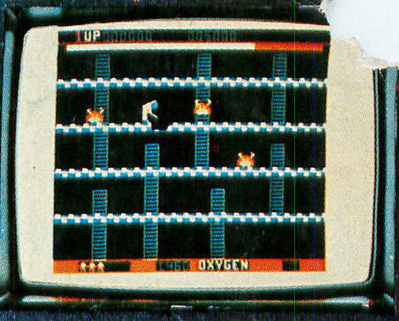

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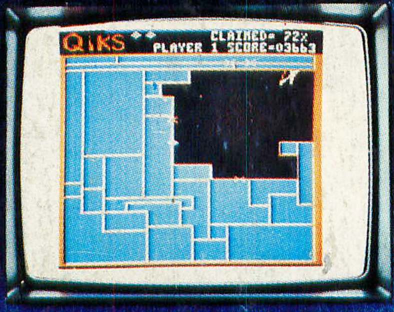

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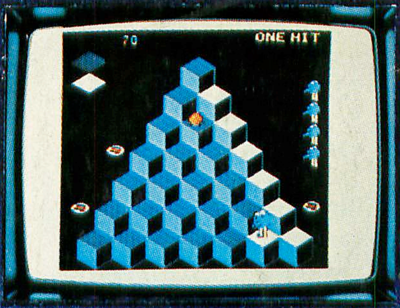

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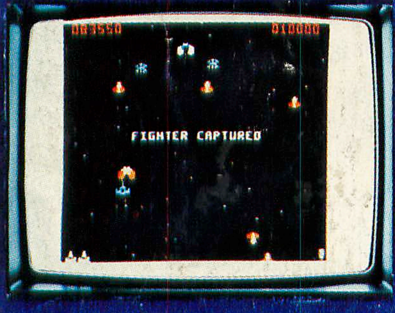

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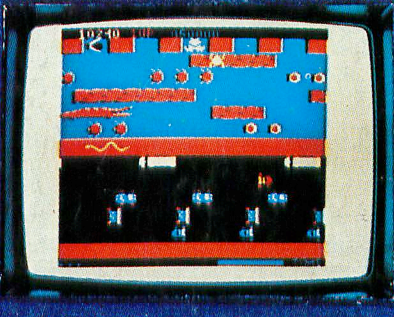
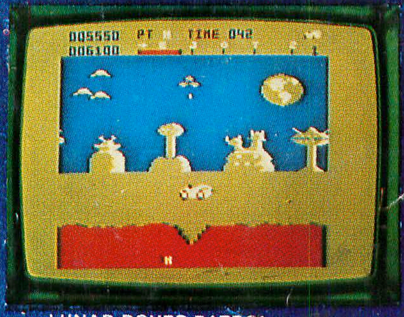


FROGGIE *(Frogger)*
A race against the clock to get "Froggie" home safely is a worthy challenge for anyone! Crossing a busy highway and avoiding a pesky otter are some of the hazards. Requires 32K and joysticks.



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